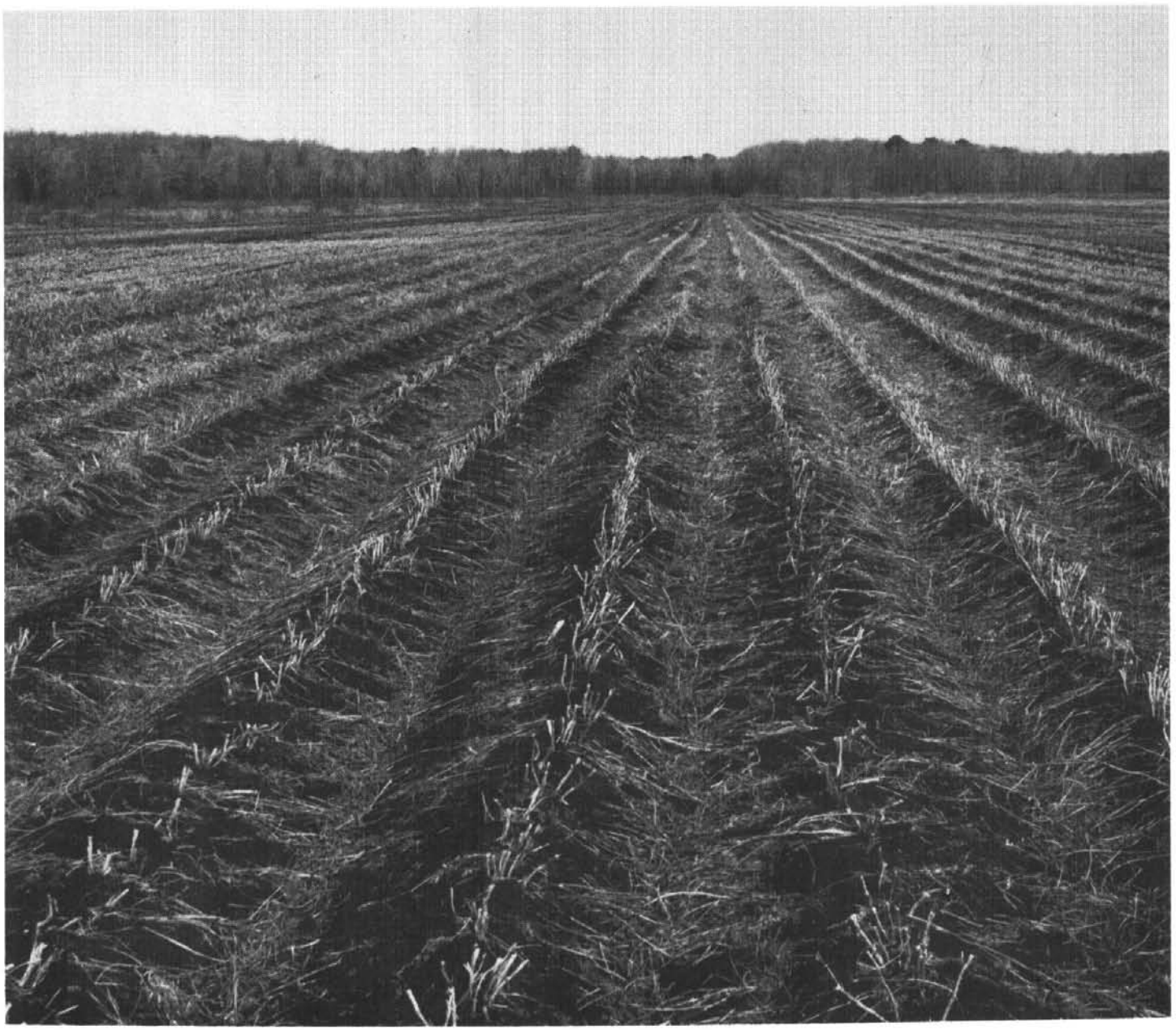
United States Department of Agriculture

Soil Conservation Service

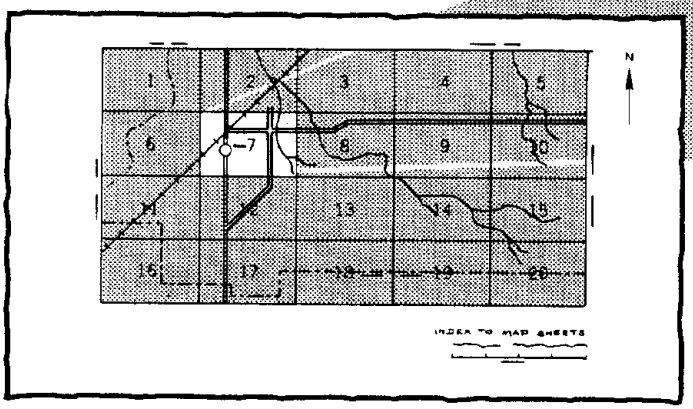
In cooperation with
North Carolina Department of Natural Resources and Community Development
North Carolina Agricultural Research Service
North Carolina Agricultural Extension Service
Tyrrell County Board of Commissioners

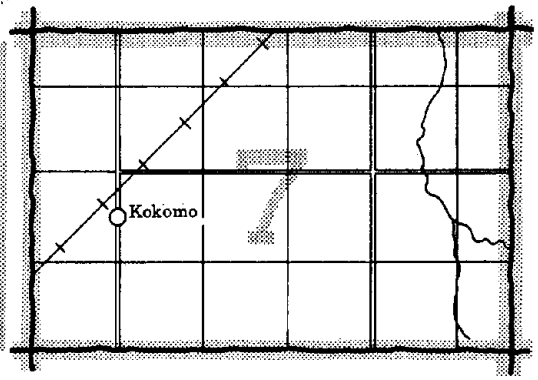
Soil Survey of Tyrrell County, North Carolina



HOW TO USE

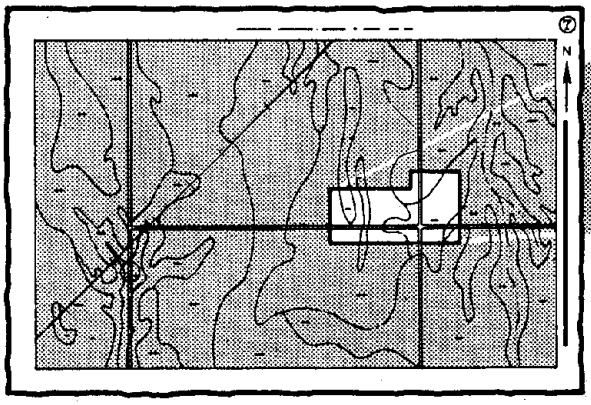
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

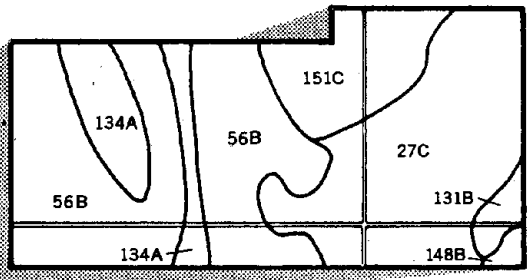




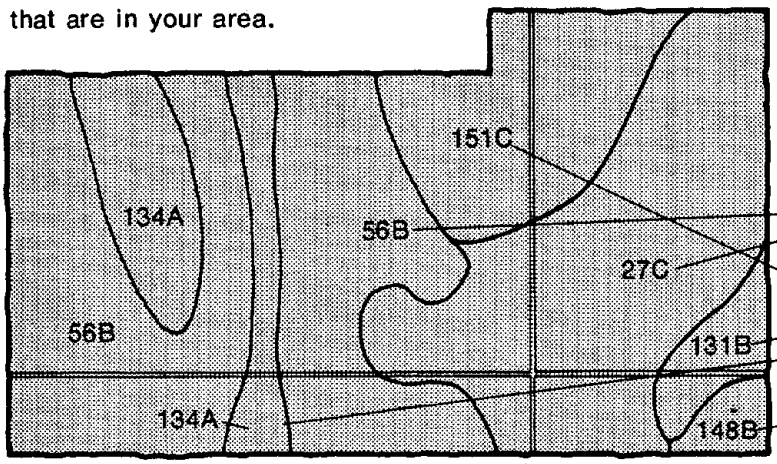
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the mapping unit symbols that are in your area.

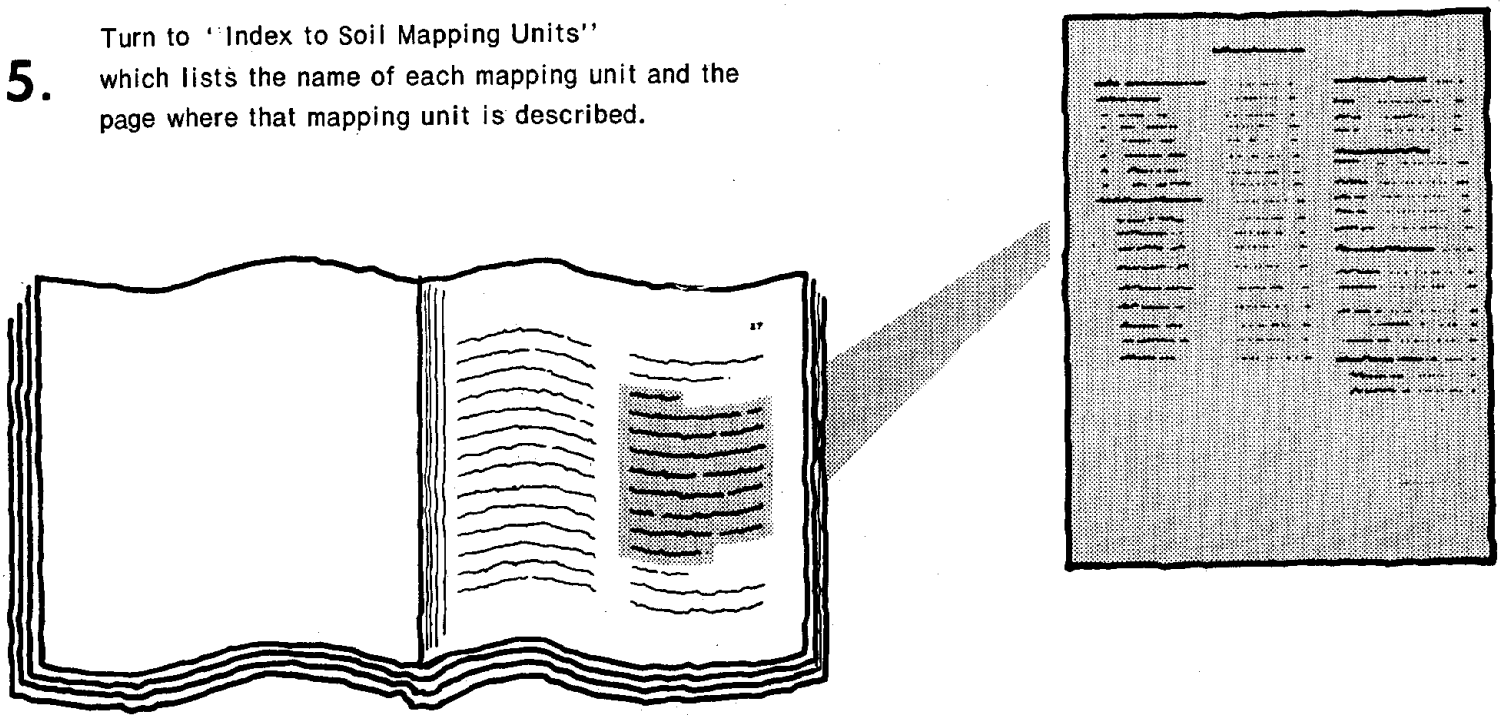


Symbols

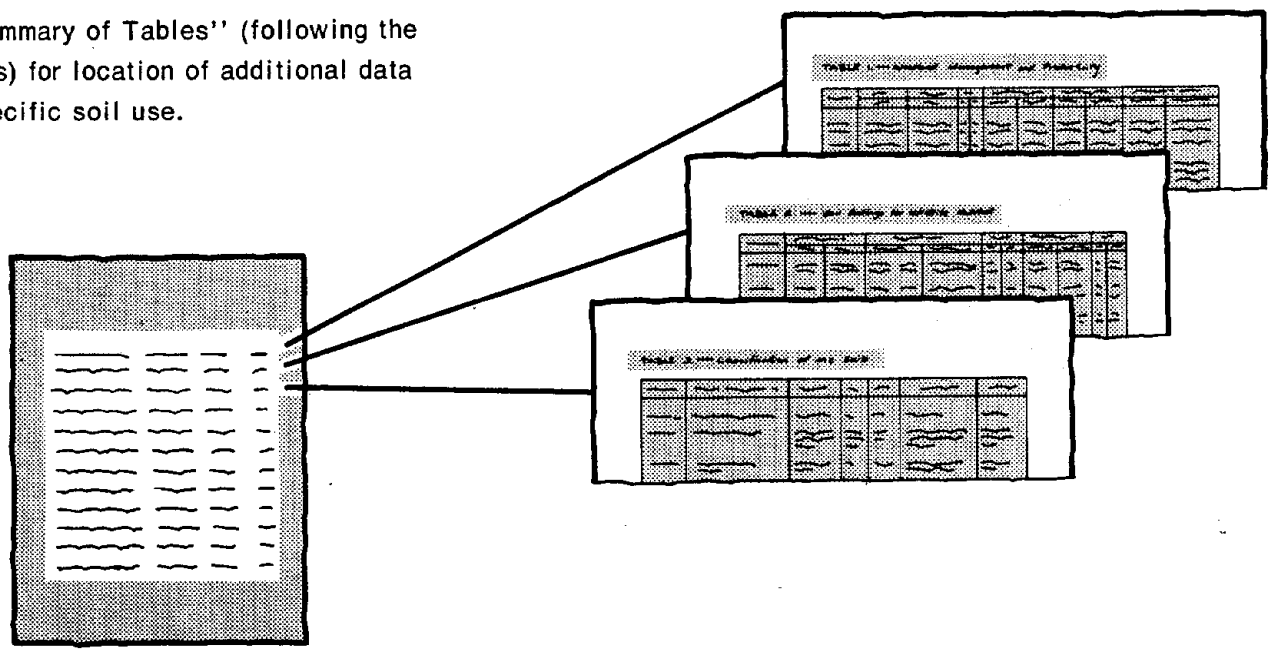
27C
56B
131B
134A
148B
151C

THIS SOIL SURVEY

5. Turn to "Index to Soil Mapping Units" which lists the name of each mapping unit and the page where that mapping unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in 1985. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This soil survey was made cooperatively by the Soil Conservation Service and the North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, and Tyrrell County Board of Commissioners. It is part of the technical assistance furnished to the Tyrrell County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

The first soil survey of Tyrrell County was published in 1920. This survey updates the first soil survey and provides additional information.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: The soybean stubble is on Portsmouth loam, rarely flooded. Where drained, this soil is well suited to use as cropland.

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Issued July 1988

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Cf—Cape Fear loam, rarely flooded 9
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Foreword

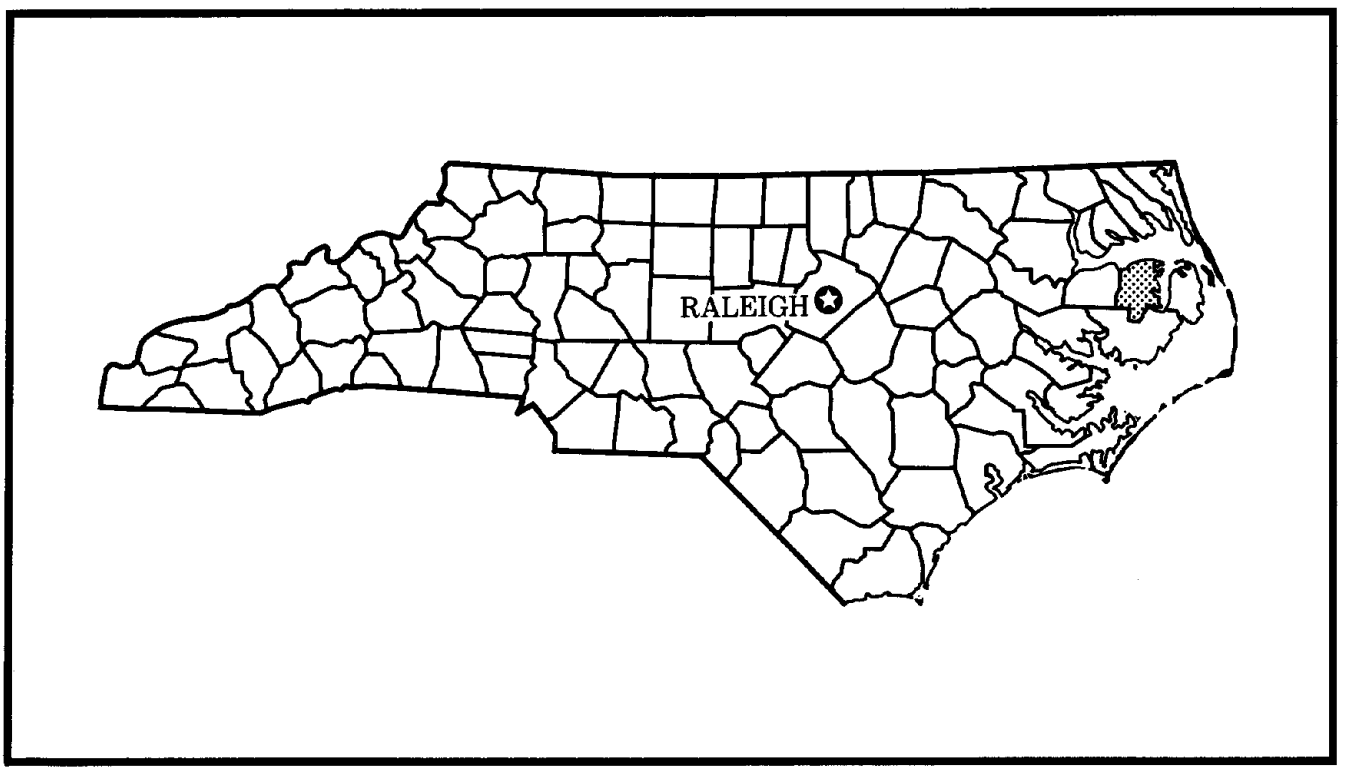
This soil survey contains information that can be used in land-planning programs in Tyrrell County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the North Carolina Extension Service.

Bobbye J. Jones
State Conservationist
Soil Conservation Service



Location of Tyrrell County in North Carolina.

Soil Survey of Tyrrell County, North Carolina

By Phillip L. Tant, Soil Conservation Service

Soils surveyed by Phillip L. Tant, John A. Gagnon, Jr., Everett Coates, Robert H. Ranson, Jr., Soil Conservation Service; W. Allen Hayes, Jr., North Carolina Department of Natural Resources and Community Development; and Steve Barnes, First Colony Farms

United States Department of Agriculture, Soil Conservation Service
In cooperation with
North Carolina Department of Natural Resources and Community Development,
North Carolina Agricultural Research Service,
North Carolina Agricultural Extension Service,
and the Tyrrell County Board of Commissioners

TYRRELL COUNTY is in the northeastern lower Coastal Plain region of North Carolina. The 1980 U.S. Census reported a population of 3,976. Columbia, the county seat, had a population of 758. The county has a land area of 260,364 acres.

The county lies within two main stream drainage areas. The northwestern part of the county drains into the Scuppernong River. The rest of the county drains into the Alligator River by way of many small creeks and canals.

Elevation ranges from about 15 feet above mean sea level in the southwestern part of the county to 2 feet along the Albemarle Sound and Alligator River. The highest elevation in the county is 17 feet in the New Lands section.

General Nature of the Survey Area

This section gives general information concerning the county. It describes settlement, water supply, and climate.

Settlement

The area known today as Tyrrell County was first inhabited by the Secotan Indians. The first Europeans to explore the area were Armadas and Barlowe in about 1584. Almost a century passed before Captain Thomas Miller and Colonel Joshua Tarkington traveled from Edenton to investigate the Scuppernong River area in 1680.

After these early explorations, settlers slowly began to arrive from north of the Albemarle Sound and by 1729, there were enough people to require a separate governmental unit. Tyrrell precinct was formed from parts of present-day Chowan, Bertie, Currituck, and Pasquotank Counties and was named in honor of Sir John Tyrrell, a Lord Proprietor of the colony. Tyrrell was a rather oversized precinct stretching from Roanoke Island almost to Tarboro.

From 1774 to 1870, Tyrrell County underwent a drastic reduction in size. Three new counties, Martin, Washington, and Dare, were formed from what had been Tyrrell County. When Washington County separated from Tyrrell in 1799, the Tyrrell County seat made its final move from a courthouse on the Scuppernong River to the town of Elizabeth, later renamed Columbia.

From the beginning, agriculture and forest products were important in Tyrrell County and were the backbone of its economy. The first settlers farmed for survival or tended land for absentee owners from Edenton. In time, large, nearly self-sufficient plantations were established. After the Civil War these large plantations failed and agricultural production declined. With more scientific

farming and forestry techniques in the early 1900's, however, agriculture became prominent once again, making Tyrrell County one of the most productive in the entire state.

Water Supply

Tyrrell County is drained by the Alligator and Scuppernong Rivers and their tributaries. The estuarine parts of these streams are brackish nearly all the time. On the north, the county is bordered by the Albemarle Sound. The community of Columbia obtains water from an underground water source.

The county is underlain by thousands of feet of sedimentary rocks, but fresh water is only within the upper part, to a depth of a few hundred feet. The depth to salty water varies from more than 400 feet in the southwestern part of the county to less than 100 feet in the vicinity of the sound. In the southwestern part of the county, the limestone aquifer may be capable of yielding over 1,000 gallons per minute. Elsewhere in the county, the limestone aquifer contains only salty water. Overlying this aquifer is a sequence of sands and shales belonging to the upper sandy aquifer, which probably yields hundreds of gallons per minute to individual wells in the southwestern part of the county, but less than 100 gallons per minute in the vicinity of the sound. The well water tends to be very hard, alkaline, and may contain excessive iron.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

Tyrrell County, North Carolina, is hot and humid in summer, but the coast is frequently cooled by sea breezes. Winter is cool, with occasionally brief cold spells. Rains occur throughout the year and are fairly heavy; snowfall is rare. Annual precipitation is adequate for all crops commonly grown in the survey area.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Plymouth, North Carolina, in the period 1951 to 1979. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 44 degrees F, and the average daily minimum temperature is 32 degrees. The lowest temperature on record, which occurred at Plymouth on January 13, 1962, is 1 degree. In summer the average temperature is 77 degrees, and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred on June 27, 1954, is 102 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 30 inches, or 60 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 25 inches. The heaviest 1-day rainfall during the period of record was 5.2 inches at Plymouth on September, 19, 1955. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is 4 inches. The greatest snow depth at any one time during the period of record was 12 inches. On the average, only 1 day has at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 65 percent of the time possible in summer and 60 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 11 miles per hour, late in winter and early in spring. Every few years, a hurricane crosses the area.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; and the kinds of crops and native plants growing on the soils. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the parent material, has been changed very little by leaching or by plant roots.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the

soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Tomotley-Augusta-Altavista

Nearly level, poorly drained, somewhat poorly drained, and moderately well drained soils that have a loamy and sandy surface layer and a loamy subsoil; on uplands

This map unit is along the Albemarle Sound, Scuppernong River, and their tributaries, and it makes up about 10 percent of Tyrrell County. It is 56 percent Tomotley soils, 20 percent Augusta soils, 13 percent Altavista soils, and 11 percent soils of minor extent. The minor soils include Conetoe, Portsmouth, Roanoke, State, and Wahee.

The Tomotley soils are poorly drained. The surface layer is very dark gray fine sandy loam. The subsoil is gray sandy clay loam in the upper part and light brownish gray sandy loam in the lower part. The substratum is light brownish gray sand.

The Augusta soils are somewhat poorly drained. The surface layer is dark grayish brown fine sandy loam. The subsoil is light olive brown sandy clay loam and clay loam in the upper part and gray and light gray sandy clay loam in the lower part. The substratum is light gray loamy sand.

The Altavista soils are moderately well drained. The surface layer is dark brown loamy fine sand. The subsurface layer is light yellowish brown loamy fine sand. The subsoil is yellowish brown sandy clay loam in the upper part and yellowish brown fine sandy loam in the lower part. The substratum is mottled yellowish brown and light yellowish brown sand.

The soils of this map unit are used mainly as cropland and to a lesser extent as pasture and woodland. Wetness is the main limitation.

2. Weeksville-Perquimans

Nearly level, very poorly drained and poorly drained soils that have a loamy surface layer and loamy subsoil; on stream terraces

Large parts of this map unit are in the Fort Landing and Gum Neck area. The map unit makes up about 9 percent of Tyrrell County. It is 60 percent Weeksville soils, 35 percent Perquimans soils, and 5 percent soils of minor extent. Minor soils include Portsmouth, Roper, Belhaven, Wasda, Augusta, and Tomotley.

The Weeksville soils are very poorly drained. The surface layer is black silt loam. The subsoil is dark grayish brown silt loam in the upper part and light brownish gray very fine sandy loam in the lower part. The substratum is loamy fine sand that is gray in the upper part and dark greenish gray in the lower part.

The Perquimans soils are poorly drained. The surface layer is very dark grayish brown loam. The subsurface layer is light gray loam. The subsoil is loam that is light gray in the upper part and gray in the lower part. The substratum is light gray loam in the upper part and light gray very fine sandy loam in the lower part.

The soils of this map unit are used mainly as cropland and to a lesser extent as pasture and woodland. The main limitation is wetness.

3. Hyde-Portsmouth-Cape Fear

Nearly level, very poorly drained soils that have a loamy surface layer and a loamy or clayey subsoil; on stream terraces

This map unit is in the central and northern part of Tyrrell County, and it makes up 19 percent of the county. It is 42 percent Hyde soils, 26 percent Portsmouth soils, 16 percent Cape Fear soils, and 16 percent soils of minor extent. The minor soils include Roper, Weeksville, Roanoke, Argent, Wasda, and Arapahoe.

The surface layer of Hyde soils is black loam in the upper part and very dark gray loam in the lower part. The subsoil is loam that is light brownish gray in the

upper part and grayish brown in the lower part. The substratum is light brownish gray loam.

The surface layer of Portsmouth soils is very dark gray loam. The subsoil is sandy clay loam that is grayish brown in the upper part and gray in the lower part. The substratum is light brownish gray and grayish brown loamy sand and sand.

The surface layer of Cape Fear soils is very dark gray loam. The subsoil is clay that is dark grayish brown in the upper part, grayish brown in the middle part, and mottled gray, light olive gray, and olive in the lower part. The substratum is greenish gray loamy sand.

The soils of this map unit are used as cropland or woodland. They generally are not used for urban or recreation use. Wetness and permeability are the main limitations to use and management.

4. Belhaven-Roper-Ponzer

Nearly level, very poorly drained soils that have a mucky surface layer underlain by loamy material; on broad flats

This map unit makes up about 17 percent of Tyrrell County. It is 41 percent Belhaven soils, 33 percent Roper soils, 16 percent Ponzer soils, and 10 percent soils of minor extent. The minor soils include Wasda, Pungo, Hyde, and Cape Fear.

The surface layer of Belhaven soils is black muck. Below that is black, dark reddish brown, and very dusky red muck. The underlying mineral soil is dark grayish brown mucky loam and very dark grayish brown loam.

The surface layer of Roper soils is black muck. The underlying mineral soil is black mucky silt loam in the upper part, very dark grayish brown and dark grayish brown silty clay loam in the middle part, and gray silt loam and greenish gray loamy sand in the lower part.

The surface layer of Ponzer soils is black muck. The underlying mineral soil is dark gray clay loam in the upper part and greenish gray sandy loam in the lower part.

The soils of this map unit are used mainly as cropland and to a lesser extent as woodland. The main limitations are wetness and low strength.

5. Dorovan-Chowan

Nearly level, very poorly drained and poorly drained soils that have a mucky or loamy surface layer and underlying material that is muck; on flood plains

This map unit is on the flood plains of the Alligator and Scuppernong Rivers, and along the Albemarle Sound. It makes up about 11 percent of Tyrrell County. It is 89 percent Dorovan soils, 7 percent Chowan soils, and 4 percent soils of minor extent that include Pungo soils.

The Dorovan soils are very poorly drained. The surface layer is black muck. It is underlain by muck that is black in the upper part and dark reddish brown in the lower part.

The Chowan soils are poorly drained. The surface layer is very dark grayish brown silt loam. Below that is dark gray silt loam that is underlain by dark reddish brown muck.

The soils of this map unit are used almost exclusively as woodland. Wetness, flooding, and low strength are concerns in use and management.

6. Pungo

Nearly level, very poorly drained soils that are muck to a depth of 51 inches or more; on broad flats

This map unit is mainly in the southwestern part of the county and in the eastern part bordering the Alligator River. It makes up about 34 percent of Tyrrell County. It is 94 percent Pungo soils and 6 percent soils of minor extent that include Ponzer, Belhaven, and Dorovan.

The surface layer of Pungo soils is black muck. Below that is muck that is black in the upper part and dark reddish brown in the lower part. The underlying material is black mucky loam in the upper part, mottled black and dark grayish brown clay loam in the middle part, and dark gray clay loam in the lower part.

The soils of this map unit are used almost exclusively as wildlife habitat and woodland. Wetness, low strength, and content of logs, stumps, and roots throughout the soil are the main limitations to use and management.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Portsmouth loam is one of several phases in the Portsmouth series. In Tyrrell County, only one phase of each soil series has been recognized.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

AaA—Altavista loamy fine sand, 0 to 2 percent slopes. This soil is moderately well drained. It is mainly in the northern part of the county on low ridges between small drainageways and streams that flow into the Albemarle Sound and Scuppernong River. The areas are irregular in shape and range from 5 to 50 acres.

Typically, the surface layer is dark brown loamy fine sand 6 inches thick. The subsurface layer is light yellowish brown loamy fine sand to a depth of 10 inches. The subsoil extends to a depth of about 43 inches. It is yellowish brown sandy clay loam in the upper part and yellowish brown fine sandy loam in the lower part. The substratum to a depth of 60 inches is mottled yellowish brown and light yellowish brown sand.

Permeability is moderate, and the available water capacity is moderate. This soil ranges from very strongly acid to medium acid except where lime has been added. The seasonal high water table is at a depth of about 1.5 to 2.5 feet late in winter and early in spring.

Included with this soil in mapping are small areas of Augusta and State soils. Augusta soils are in small depressions. State soils are near the outer edge of the map unit delineation. The included soils make up about 10 percent of the map unit.

This Altavista soil is used mainly as cropland and pasture but in some areas, it is still used as woodland.

Corn and soybeans are the major crops. Seasonal wetness is a limitation for some specialty crops, such as peanuts. Winter cover crops, conservation tillage, and crop residue management help maintain tilth and production. Conservation practices, such as no-tillage planting, field borders, and crop rotations that include close-growing crops, help conserve soil and water. The soil is also used for pasture forages.

Wetness is the main limitation for woodland use and management. The dominant native trees are black tupelo, elm, yellow poplar, sweetgum, hickory, red maple, American beech, willow oak, white oak, post oak, southern red oak, water oak, and loblolly pine. The understory plants include dogwood, sweetbay, sourwood, American holly, waxmyrtle, and sassafras.

Wetness is the main limitation for urban and recreation uses.

This Altavista soil is in capability subclass IIw. The woodland ordination symbol is 9W.

Ap—Arapahoe fine sandy loam, rarely flooded. This soil is nearly level and is very poorly drained. It is on broad flats and in depressions. Large areas of this soil are in the northern half of the county. The areas are irregular in shape and range from 10 to 600 acres.

Typically, the surface layer is black fine sandy loam 12 inches thick. The subsoil extends to a depth of 38 inches. It is fine sandy loam that is grayish brown in the upper part and light brownish gray in the lower part. The

substratum to a depth of 62 inches is light brownish gray loamy fine sand in the upper part and light gray fine sand in the lower part.

Permeability is moderately rapid. The surface layer and upper part of the subsoil are strongly acid to extremely acid except where lime has been added. The lower part of the subsoil and the substratum range from strongly acid to mildly alkaline. The seasonal high water table is at or near the surface in undrained areas. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Portsmouth and Wasda soils. Also included are small sandy areas. The included soils occur at random but are not indicated by an apparent change in the landscape. The included soils make up about 10 percent of the map unit.

Most of this Arapahoe soil is used as cropland; the rest is used mainly as woodland.

Corn and soybeans are the major crops. Wetness is the main limitation; however, conservation tillage, cover crops, and the inclusion of grasses and legumes in the cropping system help maintain organic matter and production. Wetness often delays spring tillage and fall harvest. The lack of suitable outlets is a concern in installing drainage systems.

Wetness is the main management concern for woodland use and management. The dominant trees are baldcypress, red maple, green ash, sweetgum, black tupelo, swamp tupelo, elm, yellow poplar, river birch, water oak, and willow oak. The understory plants include white cedar, American holly, sweetbay, sourwood, reeds, and waxmyrtle.

Wetness is the main limitation to urban and recreation uses, and in addition, this soil is subject to rare flooding.

This Arapahoe soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

Ar—Argent silt loam, rarely flooded. This soil is nearly level and is poorly drained. It is in the northwestern part of the county on broad flats near small streams that flow into the Albemarle Sound. This map unit consists of one broad area that is about 4,000 acres.

Typically, the surface layer is dark gray silt loam 6 inches thick. The subsoil extends to a depth of about 54 inches. It is dark grayish brown silty clay loam in the upper part, gray and grayish brown clay and silty clay in the middle part, and light olive gray silty clay loam in the lower part. The substratum to a depth of 70 inches is light brownish gray silt loam.

Permeability is slow, and the shrink-swell potential is moderate. Except where lime has been added, the soil ranges from medium acid to extremely acid to a depth of 50 to 60 inches. Below that, it ranges from medium acid to mildly alkaline. The seasonal high water table is at or near the surface in undrained areas. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Cape Fear and Roanoke soils. Most of the included soils are on the outer edge of the map unit delineation. The included soils make up about 10 to 15 percent of the map unit.

Most of this Argent soil is used as cropland; the rest is used mainly as woodland.

Corn and soybeans are the major crops. Wetness is the main limitation. Conservation tillage, cover crops, and the inclusion of grasses and legumes in a crop rotation system help maintain tilth and production. Wetness can delay spring tillage and fall harvest. The lack of suitable outlets and the slow permeability of this soil are concerns in installing drainage systems.

Wetness is the main limitation for woodland use and management, and flooding is a hazard. The dominant native trees are loblolly pine, yellow poplar, red maple, green ash, hickory, sweetgum, elm, water oak, and willow oak. The understory plants include Atlantic white-cedar, American holly, sweetbay, sourwood, reeds, and waxmyrtle.

The main limitations for most urban and recreation uses are wetness, slow permeability, and low strength. In addition, this soil is subject to rare flooding.

This Argent soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

At—Augusta fine sandy loam. This soil is nearly level and is somewhat poorly drained. It is in the northern part of the county, adjacent to small streams and waterways that flow into the Albemarle Sound, Scuppernong River, and Alligator River. The areas are irregular in shape and range from 5 to 50 acres.

Typically, the surface layer is dark grayish brown fine sandy loam 6 inches thick. The subsoil extends to a depth of about 49 inches. It is light olive brown sandy clay loam and clay loam in the upper part and gray and light gray sandy clay loam in the lower part. The substratum to a depth of 62 inches is light gray loamy sand.

Permeability is moderate. This soil ranges from very strongly acid to medium acid except where lime has been added. The seasonal high water table is within 1 to 2 feet of the surface.

Included with this soil in mapping are small areas of Altavista and Wahee soils. Small knolls of Altavista soils can be throughout the map unit; however, most of the included soils are near the outer edge of the map unit delineation. Also included are areas of soils similar to the Augusta soil except that the surface layer and subsoil are not as thick. The included soils make up about 10 percent of the map unit.

Most of this Augusta soil is used as cropland.

Corn and soybeans are the major crops. Wetness is the main limitation. Winter cover crops, conservation tillage, and crop residue management help maintain tilth and production. Conservation practices, such as no-

tillage planting, field borders, and crop rotations that include close-growing crops, help conserve soil and water.

Wetness is the main limitation for woodland use and management. The dominant native trees are loblolly pine, sweetgum, red maple, yellow poplar, willow oak, water oak, black cherry, and American beech. The major understory plants include dogwood, sourwood, sweetbay, and sassafras, and a variety of briers and reeds.

Wetness is the main limitation for urban and recreation uses.

This Augusta soil is in capability subclass IIIw. The woodland ordination symbol is 9W.

Ba—Belhaven muck, rarely flooded. This soil is nearly level and is very poorly drained. It is in the blacklands region. The areas are irregular in shape and range from 200 to 1,000 acres.

Typically, the surface layer is black muck 6 inches thick. Below that, to a depth of 43 inches, are layers of black, very dusky red, and dark reddish brown muck. The underlying mineral layers are dark grayish brown and very dark grayish brown mucky loam and loam.

The organic matter is highly decomposed. The permeability is moderately slow to moderately rapid. The organic layers are extremely acid except where lime has been added. The underlying mineral layer ranges from slightly acid to extremely acid. In most areas, many logs, roots, and stumps are throughout the organic layer. The seasonal high water table is at or near the surface. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Pungo, Roper, and Wasda soils that occur at random within the map unit but are not indicated by an apparent change in the landscape. The included soils make up about 15 percent of the map unit.

Most of this Belhaven soil is used as cropland; the rest is used as woodland.

Corn and soybeans are the major crops. Large applications of lime and additions of copper and other micronutrients are initially necessary for agriculture. The many logs, roots, and stumps must be removed before cultivation (fig. 1). Wetness can delay spring tillage and fall harvest, and soil blowing can occur during spring planting. Conservation practices, such as conservation tillage, field borders, and windbreaks, reduce soil blowing.

Wetness is the main limitation for woodland use and management. The dominant native trees are red maple, Atlantic white-cedar, pond pine, sweetgum, baldcypress, and blackgum. The understory plants include inkberry, fetterbush lyonia, huckleberry, greenbrier, waxmyrtle, and switchcane.

The main limitations for urban and recreation uses are wetness and low strength. This soil is also subject to rare flooding.

This Belhaven soil is in capability subclass IVw. The woodland ordination symbol is 6W.

Cf—Cape Fear loam, rarely flooded. This soil is nearly level and is very poorly drained. It is commonly in the blackland region on broad flats. The areas are irregular in shape and range from 10 to 1,000 acres.

Typically, the surface layer is very dark gray loam 11 inches thick. The subsoil is clay and extends to a depth of about 50 inches. It is dark grayish brown in the upper part, grayish brown in the middle part, and mottled gray, light olive gray, and olive in the lower part. The substratum to a depth of 62 inches is greenish gray loamy sand.

Permeability is slow, and the shrink-swell potential is moderate. This soil ranges from very strongly acid to medium acid except where lime has been added. The seasonal high water table is at or near the surface in undrained areas. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Portsmouth, Roanoke, Argent, and Roper soils. Most of the included soils are near the outer edge of the map unit delineation; however, Roper soils are in small depressions within the delineation. The included soils make up about 10 percent of the map unit.

Most of this Cape Fear soil is used as cropland; the rest is used mainly as woodland.

Corn and soybeans are the major crops (fig. 2). Fescue and ladino clover, however, are grown for pasture forage. Wetness is the main limitation. Conservation tillage, cover crops, and the inclusion of grasses and legumes in a crop rotation system help maintain tilth and production. Wetness can delay spring tillage and fall harvest. The lack of suitable outlets and the slow permeability of this soil are concerns in installing drainage systems.

Wetness is the main limitation for woodland use and management. The dominant native trees are baldcypress, pond pine, loblolly pine, red maple, green ash, hickory, sweetgum, swamp tupelo, elm, river birch, water oak, willow oak, and swamp white oak. The understory plants include cedar, American holly, sweetbay, sourwood, reeds, and waxmyrtle.

The main limitations to urban and recreation uses are wetness, slow permeability, and low strength. This soil is also subject to rare flooding.

This Cape Fear soil is in capability subclass IIIw. The woodland ordination symbol is 11W.

Ch—Chowan silt loam, frequently flooded. This soil is nearly level and is poorly drained. It is on flood plains of small streams that flow into the Albemarle Sound. The areas are narrow and oblong and range up to 200 acres.

Typically, the surface layer is very dark grayish brown silt loam 6 inches thick. The underlying material to a depth of 25 inches is dark gray silt loam. This mineral

Figure 1.—A cleared field of Belhaven muck, rarely flooded, contains many logs, roots, and stumps that are being burned to prepare the field for cultivation.

layer is underlain by an organic layer that is dark reddish brown muck to a depth of 70 inches.

Permeability is moderately slow in the mineral layer and moderately rapid to moderately slow in the organic layer. This soil ranges from extremely acid to medium acid in the mineral layer and is extremely acid or very strongly acid in the organic layer. This soil is frequently flooded for very long periods.

Included with this soil in mapping are small areas of Dorovan muck. The Dorovan soils are on the downstream side of the map unit delineation. Also included are areas where the overlying mineral material is less than 16 inches thick. The included soils make up about 10 to 15 percent of the map unit.

Most of this Chowan soil is used as woodland.

Wetness and poor trafficability are the main limitations to woodland use and management. The dominant native species are green ash, pond pine, baldcypress, sweetgum, water tupelo, Atlantic white-cedar, and red maple. The understory plants are mainly sweetbay, greenbrier, sourwood, and giantcane.

Wetness is the main limitation for agricultural uses, and low strength is the main limitation for urban uses. Frequent flooding is a hazard for agricultural, urban, and recreation uses.

This Chowan soil is in capability subclass VIIw. The woodland ordination symbol is 8W.

CtA—Conetoe loamy fine sand, 0 to 3 percent slopes. This soil is well drained and is mainly in the northwestern part of the county on low ridges between the small drainageways and streams that flow into the Albemarle Sound and Scuppernong River. The areas are irregular in shape and range from 5 to 30 acres.

Typically, the surface layer is dark brown loamy fine sand 7 inches thick. The subsurface layer to a depth of 26 inches is yellowish brown loamy fine sand. The subsoil extends to a depth of 38 inches. The upper part is strong brown fine sandy loam and sandy clay loam, and the lower part is yellowish brown loamy fine sand. The substratum to a depth of 65 inches is brownish yellow fine sand.

Permeability is moderately rapid. The soil ranges from very strongly acid to medium acid except where lime has been added.

Included with this soil in mapping are small areas of Altavista and State soils. State soils occur at random within the map unit but are not indicated by an apparent

Figure 2.—This mature stand of corn is on Cape Fear loam, rarely flooded.

change in landscape. Altavista soils are in slight depressions. The included soils make up about 10 percent of the map unit.

Most of this Conetoe soil is used as cropland. The rest is used mainly as woodland.

Peanuts, corn, and soybeans are the major crops; however, coastal burmudagrass and bahiagrass are grown for pasture forage. The main concerns in cropland use and management are the leaching of plant nutrients, wind erosion, and droughtiness. Planting small grains in alternate rows can help prevent damage to young tender plants, such as watermelons. Winter cover crops, conservation tillage, and crop residue management help maintain organic matter content and conserve moisture. Windbreaks and a crop rotation system that includes close-growing crops also help conserve soil and water. Fertilizers, particularly nitrogen, should be added in split applications.

The low available water capacity is the main limitation for woodland use and management. The dominant native trees are loblolly pine, longleaf pine, red maple, hickory, sweetgum, black tupelo, southern red oak, white oak, and post oak. The understory plants include dogwood, sassafras, American holly, and sourwood.

This soil has no major limitations for most urban and recreation uses. The thick sandy materials provide a good base for most structures. The unprotected sandy surface is subject to soil blowing, however, and it is droughty when rainfall is limited.

This Conetoe soil is in capability subclass IIs. The woodland ordination symbol is 8S.

Do—Dorovan muck, frequently flooded. This soil is nearly level and is very poorly drained. It is on flood plains of the Albemarle Sound, Scuppernong River, Alligator River, and their tributaries. The areas are oblong in shape and range from 50 to 4,000 acres.

Typically, this soil is muck to a depth of more than 90 inches. It is black in the upper part and dark reddish brown in the lower part.

The organic matter is highly decomposed. Permeability is moderate. This soil is extremely acid or very strongly acid. The seasonal high water table is at or near the surface. The soil is subject to frequent flooding for very long periods.

Included with this soil in mapping are small areas of Chowan and Pungo soils. Chowan soils occur at the upstream edge of the map unit delineation. Pungo soils occur at the outer edge of the delineation. Also included are areas where the muck is less than 51 inches deep. These areas are most common in narrow sloughs in the Fort Landing area. The included soils make up about 15 percent of the map unit.

Most of this Dorovan soil is used as woodland.

Wetness and poor trafficability are the main limitations for woodland use and management. The dominant native trees are green ash, pond pine, baldcypress, swamp tupelo, water tupelo, Atlantic white-cedar, and red maple. The understory plants include redbay, greenbrier, and waxmyrtle.

Wetness is the main limitation for agricultural uses, and low strength is the main limitation for urban uses. Frequent flooding is a hazard for agricultural, urban, and recreational uses.

This Dorovan soil is in capability subclass VIIw. The woodland ordination symbol is 7W.

Hy—Hyde loam, rarely flooded. This soil is nearly level and is very poorly drained. It is on broad flats, mainly in the Gum Neck, Kilkenny, and Fort Landing areas. The areas are typically large, ranging up to 1,000 acres.

Typically, the surface layer is loam 15 inches thick. It is black in the upper part and very dark gray in the lower part. The subsoil is loam and extends to a depth of 36 inches. It is light brownish gray in the upper part and grayish brown in the lower part. The substratum to a depth of 62 inches is light brownish gray loam.

Permeability is moderately slow. The soil ranges from extremely acid to strongly acid except where lime has been added. The seasonal high water table is at or near the surface in undrained areas. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Portsmouth, Roper, Cape Fear, and Weeksville soils. The included soils occur at random but are not indicated by an apparent change in the landscape. They make up about 10 percent of the map unit.

Most of this Hyde soil is used as cropland; the rest is used mainly as woodland.

Corn and soybeans are the major crops. Wetness is the main limitation. Conservation tillage, cover crops, and the inclusion of grasses and legumes in the crop rotation system help maintain tilth and production. Wetness can delay tillage in spring. The lack of suitable outlets is a concern in installing drainage systems.

Wetness is the main limitation for woodland use and management. The dominant trees are baldcypress, pond pine, red maple, green ash, sweetgum, black tupelo, swamp tupelo, elm, yellow poplar, river birch, water oak, and willow oak. The understory plants include Atlantic white-cedar, American holly, sweetbay, sourwood, reeds, and waxmyrtle.

Wetness is the main limitation for urban and recreation uses, and this soil is subject to rare flooding.

This Hyde soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

Pe—Perquimans loam, rarely flooded. This soil is nearly level and is poorly drained. It is on broad flats, mainly in the Gum Neck and Fort Landing areas. The areas are irregular in shape and range from 10 to 500 acres.

Typically, the surface layer is very dark grayish brown loam 4 inches thick. The subsurface layer is light gray loam to a depth of 7 inches. The subsoil is loam and extends to a depth of 40 inches. It is light gray in the upper part and gray in the lower part. The substratum to a depth of 65 inches is light gray loam and very fine sandy loam.

Permeability is moderately slow. The soil ranges from very strongly acid to medium acid except where lime has been added. The seasonal high water table is within one foot of the surface in undrained areas. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Roanoke and Tomotley soils, which occur at random but are not indicated by an apparent change in the landscape. The included soils make up about 10 to 15 percent of the map unit.

Most of this Perquimans soil is used as cropland; the rest is used mainly as woodland.

Corn, potatoes, and soybeans are the major crops. Wetness is the main limitation. Winter cover crops, conservation tillage, and crop residue management help maintain tilth and production. Practices, such as no-tillage planting, field borders, and a crop rotation system that includes close-growing crops, help conserve soil and water.

Wetness is the main limitation for woodland use and management. The dominant native trees are loblolly pine, sweetgum, red maple, yellow poplar, willow oak, water oak, black cherry, and American beech. Major understory plants are dogwood, sourwood, sweetbay, and sassafras, and a variety of briers and reeds.

Wetness is the main limitation for urban and recreation uses, and this soil is subject to rare flooding.

This Perquimans soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

Po—Ponzer muck, rarely flooded. This soil is nearly level and is very poorly drained. It is in the blacklands region. The areas are irregular in shape and range from 20 to 500 acres.

Typically, the muck is black and extends to a depth of 30 inches. The underlying mineral material to a depth of 70 inches is dark gray clay loam in the upper part and greenish gray sandy loam in the lower part.

The organic matter is highly decomposed. Permeability is slow. The organic layers are extremely acid except where lime has been added. The mineral layers range from extremely acid to slightly acid. The seasonal high water table in undrained areas is at or near the surface. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Belhaven, Roper, and Wasda soils. Most of the included soils are near the outer edge of the map unit delineation. The included soils make up about 10 to 15 percent of the map unit.

Most of this Ponzer soil is used as cropland; the rest is used mainly as woodland.

Corn and soybeans are the major crops. Wetness is the main limitation and can delay spring tillage and fall harvest. Large applications of lime and the addition of copper and other micronutrients are initially necessary for agriculture. Soil blowing can be a problem during spring planting. Conservation practices, such as conservation tillage, field borders, and windbreaks, reduce the chance for soil blowing.

Wetness is the main limitation for woodland use and management. The dominant native trees are red maple, sweetbay, baldcypress, blackgum, Atlantic white-cedar, loblolly pine, and sweetgum. The understory plants include swamp cyrilla, waxmyrtle, pawpaw, pepperbush, fetterbush, lyonia, and switchcane.

Wetness and low strength are the main limitations for urban and recreation uses, and this soil is subject to rare flooding.

This Ponzer soil is in capability subclass IVw. The woodland ordination symbol is 6W.

Pt—Portsmouth loam, rarely flooded. This soil is nearly level and is very poorly drained. It is on broad flats, mostly in the northern part of the county. The areas are irregular in shape and range from 10 to 500 acres.

Typically, the surface layer is very dark gray loam 14 inches thick. The subsoil is sandy clay loam to a depth of 35 inches. It is grayish brown in the upper part and gray in the lower part. The substratum to a depth of 65 inches is light brownish gray loamy sand and grayish brown sand.

Permeability is moderate in the subsoil and rapid or very rapid in the substratum. The soil ranges from extremely acid to strongly acid throughout the surface layer and subsoil except where lime has been added. The substratum ranges from extremely acid to medium acid. The seasonal high water table is at or near the surface in undrained areas. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Wasda, Cape Fear, Hyde, and Arapahoe soils. Most of these included soils are near the outer edge of the map unit delineation. The included soils make up about 10 to 15 percent of the map unit.

Most of this Portsmouth soil is used as cropland; the rest is used mainly as woodland.

If drained, this soil is suited to most crops commonly grown in the county, mainly corn and soybeans. Wetness is the main limitation. Conservation tillage, cover crops, and the inclusion of grasses and legumes in the crop rotation system help maintain tilth and production. Wetness can delay tillage in spring. The lack of suitable outlets is a concern in installing drainage systems (fig. 3).

Figure 3.—Pumping stations provide drainage outlets where natural outlets are not available. This pumping station is in an area of Portsmouth loam, rarely flooded.

Wetness is the main limitation for woodland use and management. The dominant trees are loblolly pine, baldcypress, pond pine, red maple, green ash, sweetgum, black tupelo, swamp tupelo, elm, yellow poplar, river birch, water oak, and willow oak. The understory plants include mainly cedar, American holly, sweetbay, sourwood, reeds, and waxmyrtle.

Wetness is the main limitation for most urban and recreation uses, and this soil is subject to rare flooding.

This Portsmouth soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

Pu—Pungo muck, rarely flooded. This soil is nearly level and is very poorly drained. It is in the blacklands region. The areas are irregular in shape and range from 100 to 6,000 acres.

Typically, the muck is 65 inches thick. It is black in the upper part and dark reddish brown in the lower part. The underlying material to a depth of 95 inches is black mucky loam in the upper part, black and dark grayish brown clay loam in the middle part, and dark gray clay loam in the lower part.

The organic matter is highly decomposed. Permeability is moderately rapid, and the shrink-swell potential is moderate. This soil is extremely acid in the organic

layers except where lime has been added. The underlying mineral layers range from strongly acid to extremely acid. Many logs, roots, and stumps are throughout the soil. The seasonal high water table is at or near the surface. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Dorovan, Belhaven, and Ponzer soils. The Belhaven and Ponzer soils occur at random but are not indicated by an apparent change in the landscape. Dorovan soils occur at the outer edge of the map unit delineation. The included soils make up about 10 percent of the map unit.

This Pungo soil is used mainly as woodland.

Wetness is the main limitation for woodland use and management. The dominant native trees are pond pine, Atlantic white-cedar, red maple, and sweetbay. The understory plants include inkberry, fetterbush lyonia, greenbrier, and huckleberry.

Wetness, the high content of logs, stumps, and roots, and thickness of the organic layers are the main limitations for agricultural use (fig. 4). If this soil is drained continuously, it may become irreversibly dried and very hard, restricting root penetration and water movement. That can be avoided by using a water control system that allows the water table to rise to the natural level between growing seasons.

Wetness and low strength are the main limitations for urban and recreation uses.

This Pungo soil is in capability subclass VIIw. The woodland ordination symbol is 5W.

Ro—Roanoke loam, rarely flooded. This soil is nearly level and is poorly drained. It is on broad flats and in depressions. The areas are irregular in shape and range from 10 to 200 acres.

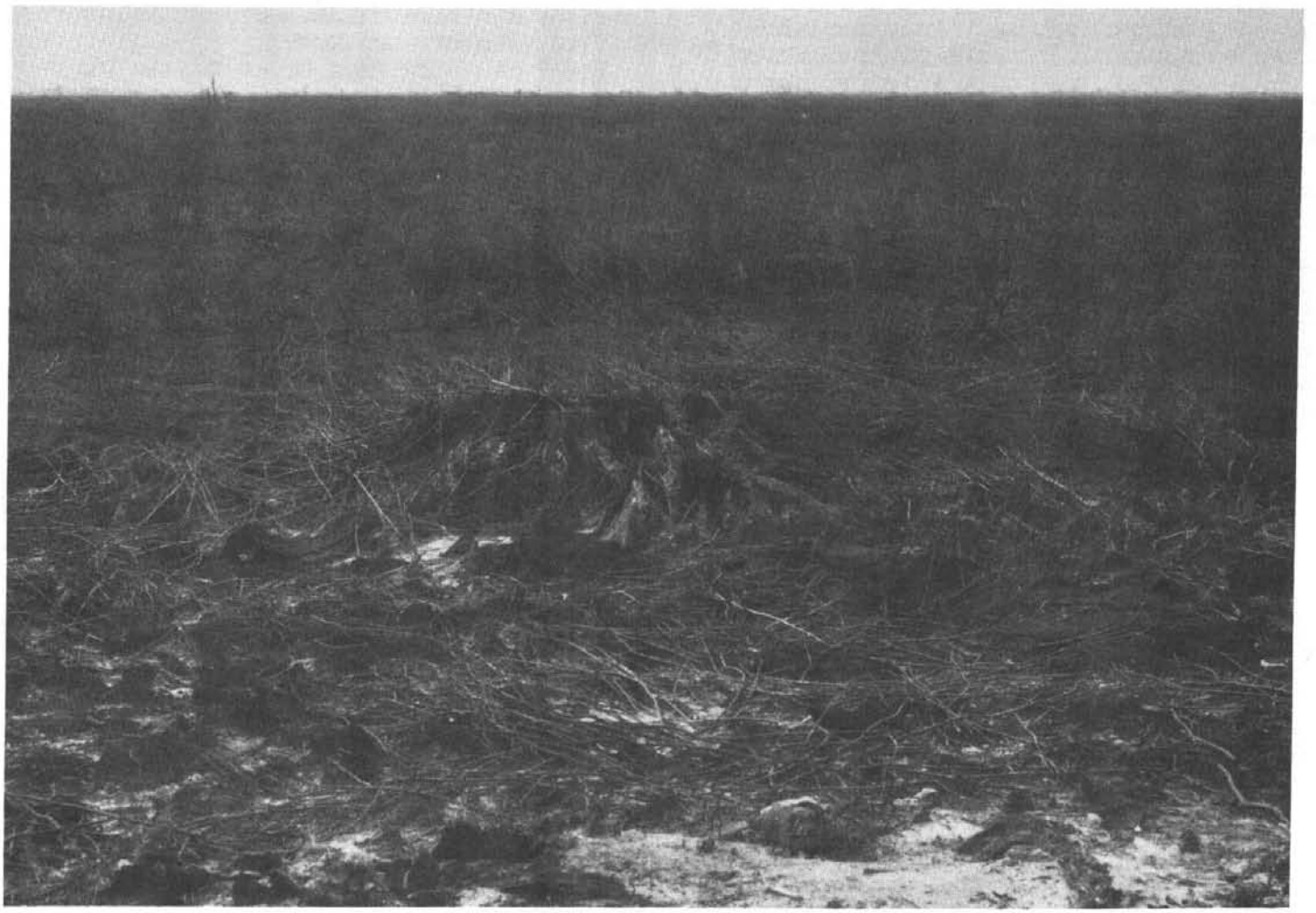


Figure 4.—Fire has exposed juniper and cypress stumps in an area of Pungo muck, rarely flooded.

Typically, the surface layer is dark grayish brown loam 8 inches thick. The subsoil extends to a depth of 43 inches. It is grayish brown loam in the upper part, dark grayish brown clay in the middle part, and mottled light brownish gray, yellowish brown, and light olive gray loam in the lower part. The substratum to a depth of 60 inches is light gray fine sand with lenses of loam.

Permeability is slow, and the shrink-swell potential is moderate. This soil is strongly acid or very strongly acid. The seasonal high water table is at or near the surface in undrained areas. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Wahee, Argent, Tomotley, and Cape Fear soils. Wahee soils are on slightly elevated ridges. Cape Fear soils are in slight depressions and in drainageways. Tomotley and Argent soils are near the outer edge of the map unit delineation. The included soils make up about 10 percent of the map unit.

Most of this Roanoke soil is used as cropland; the rest is used mainly as woodland.

The major crops are corn, soybeans, and small grains; however, pasture forage, such as fescue and ladino clover, are also grown. Wetness is the main limitation. Conservation tillage, cover crops, and the inclusion of grasses and legumes in the crop rotation system help maintain tilth and production. Wetness can delay spring tillage and fall harvest. The lack of suitable outlets and slow permeability of this soil are concerns in installing drainage systems.

Wetness is the main limitation for woodland use and management (fig. 5). The dominant native trees are loblolly pine, red maple, hickory, sweetgum, elm, river birch, water oak, and willow oak. The understory plants include Atlantic white-cedar, American holly, sweetbay, sourwood, reeds, and waxmyrtle.

Wetness, slow permeability, and low strength are the main limitations for most urban and recreation uses, and this soil is subject to rare flooding.

This Roanoke soil is in capability subclass IIIw. The woodland ordination symbol is 9W.

Rp—Roper muck, rarely flooded. This soil is nearly level and is very poorly drained. It is in the blacklands region. The areas are irregular in shape and range from 10 to 500 acres.

Typically, the surface layer is black muck 10 inches thick. The next layer is black mucky silt loam to a depth of 14 inches. The subsoil to a depth of 44 inches is very dark grayish brown and dark grayish brown silty clay loam. The substratum to a depth of 60 inches is gray silt loam in the upper part and greenish gray loamy sand in the lower part.

The organic matter is highly decomposed. Permeability is moderately slow. This soil ranges from strongly acid to extremely acid in the surface layer and subsoil. The substratum ranges from medium acid to mildly alkaline. The seasonal high water table is at or near the surface in undrained areas. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Cape Fear, Hyde, Wasda, and Belhaven soils. The included soils occur at random but are not indicated by an apparent change in the landscape. The included soils make up about 15 percent of the map unit.

Most of this Roper soil is used as cropland.

The major crops are corn and soybeans. Wetness is the main limitation for agriculture and it can delay spring tillage and fall harvest. Large initial applications of lime are necessary for crop production. Soil blowing can be a problem during spring planting. However, conservation practices, such as conservation tillage, field borders, and windbreaks, reduce the chance for soil blowing.

Wetness is the main limitation for woodland use and management. The dominant native trees are red maple, sweetbay, baldcypress, blackgum, loblolly pine, and sweetgum. The understory plants include swamp cyrilla, waxmyrtle, pawpaw, fetterbush lyonia, and switchcane.

Wetness and the high organic matter content are the main limitations to most urban and recreation uses, and this soil is subject to rare flooding.

This Roper soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

StB—State loamy fine sand, 0 to 4 percent slopes. This soil is well drained. It is in the northern part of the county on low ridges near the small streams that flow into the Albemarle Sound and Scuppernong River. The areas are irregular in shape and range from 5 to 35 acres.

Typically, the surface layer is brown loamy fine sand 4 inches thick. The subsurface layer to a depth of 7 inches is pale brown loamy fine sand. The subsoil to a depth of 42 inches is strong brown sandy clay loam in the upper part and strong brown sandy loam in the lower part. The substratum to a depth of 80 inches is yellowish brown loamy sand in the upper part and fine sand in the lower part.

Permeability is moderate, and the available water capacity is moderate. This soil is very strongly acid or strongly acid in the surface layer, subsurface layer, and subsoil. It is very strongly acid to slightly acid in the substratum.

Included with this soil in mapping are small areas of Altavista, Augusta, and Conetoe soils. The Altavista and Augusta soils are in shallow depressions within the map unit. Most of the other included soils are near the outer edge of the map unit delineation. The included soils make up about 10 percent of the map unit.

Most of this State soil is used as cropland; the rest is used mainly as woodland.

The major crops are corn, soybeans, and small grains. This soil is subject to runoff and erosion; however, winter cover crops, conservation tillage, and crop residue management help control runoff and erosion and

Figure 5.—Wetness is the main limitation for woodland use and management on Roanoke loam, rarely flooded.

maintain tilth and organic matter content. Practices, such as no-tillage planting, field borders, and crop rotations that include close-growing crops, also help conserve soil and water.

This soil has no major limitations for woodland use and management. The dominant native trees are loblolly pine, red maple, hickory, yellow poplar, black tupelo, American elm, American beech, southern red oak, water oak, and white oak. The understory plants include dogwood, sassafras, sourwood, and waxmyrtle.

There are no limitations to most urban and recreation uses.

This State soil is in capability subclass IIe. The woodland ordination symbol is 10A.

To—Tomotley fine sandy loam, rarely flooded. This soil is nearly level and is poorly drained. It is in slightly elevated areas in the blacklands and in depressions near small streams that flow into the Albemarle Sound and Scuppernong River. The areas are irregular in shape and range from 10 to 150 acres.

Typically, the surface layer is very dark gray fine sandy loam 8 inches thick. The subsoil extends to a depth of about 36 inches. It is gray sandy clay loam in the upper part and light brownish gray sandy loam in the lower

part. The substratum to a depth of 60 inches is light brownish gray sand.

Permeability is moderate or moderately slow. This soil ranges from extremely acid to strongly acid in the upper part except where lime has been added. Below a depth of about 50 inches, it ranges from extremely acid to medium acid. The seasonal high water table is at or near the surface in undrained areas.

Included with this soil in mapping are small areas of Augusta, Roanoke, and Portsmouth soils. Most of the included soils are near the outer edge of the map unit delineation. The included soils make up about 10 percent of the map unit.

Most of this Tomotley soil is used as cropland; the rest is used mainly as woodland.

Corn and soybeans are the main crops; however, pasture forages are also grown. Wetness is the main limitation. Winter cover crops, conservation tillage, and crop residue management help maintain tilth and production. Conservation practices, such as no-tillage planting, field borders, and a crop rotation system that includes close-growing crops, also help conserve soil and water (fig. 6).

Wetness is the main limitation for woodland use and management. The dominant native trees are loblolly pine, sweetgum, red maple, yellow poplar, willow oak, water oak, black cherry, and American beech. The major understory plants include dogwood, sourwood, sweetbay, and sassafras, along with a variety of briers and reeds.

Wetness is the main limitation to most urban and recreation uses, and this soil is subject to rare flooding.

Figure 6.—Conservation tillage is an effective conservation practice on Tomotley fine sandy loam, rarely flooded.

This Tomotley soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

Ud—Udorthents, loamy. This map unit consists of borrow pits where the surface layer and most of the subsoil has been removed, areas of fill or dredge material, and landfills. Most or all of the natural soil has been disturbed or covered.

The borrow pits are excavated areas from which the soil material has been removed for use as fill for construction. The cuts are from 3 to 15 feet deep. The base slope in these cuts is level to gently sloping. Most cuts have two or more short, nearly vertical side slopes. The exposed surface layer consists mainly of loamy, marine deposits. Some of the borrow pits have been smoothed and seeded to grass. A few areas are naturally reseeded to wild grasses, weeds, and pine. The areas are poorly suited to plant growth because of the poor properties of the soil, low fertility, and low available water capacity.

The fill and dredged areas are commonly near the built-up areas. The fill areas are usually elevated with loamy material to improve a site for a more intensive use, such as building sites. Slopes are generally less than 2 percent.

Landfills are areas that were used for disposing of solid waste by placing refuse in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil. When the trench is full, a final cover of soil material is placed over the landfill.

Recommendations for use and management require onsite investigation.

The Udorthents soils are not assigned a capability subclass nor woodland ordination symbol.

WaA—Wahee loam, 0 to 3 percent slopes. This soil is somewhat poorly drained. It is in the northern part of the county on low ridges near small streams that flow into the Albemarle Sound. The areas are irregular in shape and range from 5 to 40 acres.

Typically, the surface layer is grayish brown loam 5 inches thick. The subsoil to a depth of 48 inches is very pale brown clay loam in the upper part, light gray clay, gray clay and light gray clay loam in the middle part, and light gray sandy loam in the lower part. The substratum to a depth of 60 inches is light gray loamy sand.

Permeability is slow, and the shrink swell potential is moderate. This soil is strongly acid or very strongly acid throughout except where lime has been added. The seasonal high water table is within a depth of 0.5 foot to 1.5 feet.

Included with this soil in mapping are small areas of Altavista and Roanoke soils. Altavista soils can be on slightly higher ridges. Roanoke soils are in slight depressions. The included soils make up about 10 percent of the map unit.

Most of this Wahee soil is used as cropland; the rest is used mainly as woodland.

Corn and soybeans are the major crops. Wetness is the main limitation. Conservation tillage, cover crops, and the inclusion of grasses and legumes in the crop rotation system help maintain tilth and production. Wetness can delay spring tillage and fall harvest. Slow permeability is a limitation for the installation of drainage systems.

Wetness is the main limitation for woodland use and management, and flooding is a hazard. The dominant native trees are pond pine, loblolly pine, red maple, green ash, hickory, sweetgum, black tupelo, elm, river birch, American sycamore, water oak, and willow oak. The understory plants include cedar, American holly, sweetbay, sourwood, reeds, and waxmyrtle.

Wetness, slow permeability, and low strength are the main limitations for most urban and recreation uses.

This Wahee soil is in capability subclass IIw. The woodland ordination symbol 9W.

Wd—Wasda muck, rarely flooded. This nearly level soil is very poorly drained. It is in the blacklands region. The areas are irregular in shape and range from 100 to 1,000 acres.

Typically, the surface layer is black muck 15 inches thick. The next layer to a depth of 25 inches is very dark gray sandy clay loam. The subsoil to a depth of 42 inches is grayish brown sandy clay loam in the upper part and sandy loam in the lower part. The substratum to a depth of 65 inches is light gray sand with lenses of loamy sand.

The organic matter is highly decomposed. Permeability is moderate. The soil ranges from extremely acid to strongly acid in the surface layer and upper part of the subsoil. It is medium acid to mildly alkaline in the lower part of the subsoil and in the substratum. The seasonal high water table is at or near the surface in undrained areas. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Roper, Arapahoe, Portsmouth, and Belhaven soils. The included soils occur at random but are not indicated by an apparent change in the landscape. The included soils make up about 10 percent of the map unit.

Most of this Wasda soil is used as cropland; the rest is used mainly as woodland.

Corn and soybeans are the major crops. Wetness is the main limitation and can delay spring tillage and fall harvest. Large initial applications applications of lime are necessary for crop production. Soil blowing can be a problem during spring planting, but practices, such as conservation tillage, field borders, and windbreaks, reduce the chance for soil blowing.

Wetness is the main limitation for woodland use and management. The dominant native trees are red maple, sweetbay, baldcypress, blackgum, loblolly pine, and sweetgum. The understory plants include swamp cyrilla, waxmyrtle, pawpaw, fetterbush lyonia, and switchcane.

Figure 7.—Drainage systems are maintained to insure adequate water control on Weeksville silt loam, rarely flooded.

Wetness and the high organic matter content are the main limitations for most urban and recreation uses, and this soil is subject to rare flooding.

The Wasda soil is in capability subclass IIIw. The woodland ordination symbol is 10W.

Wk—Weeksville silt loam, rarely flooded. This soil is nearly level and is very poorly drained. It is on broad flats in the Gum Neck, Kilkenny, and Fort Landing areas. The areas are irregular in shape and range from 50 to more than 2,000 acres.

Typically, the surface layer is black silt loam 13 inches thick. The subsoil to a depth of 42 inches is dark grayish brown silt loam in the upper part and light brownish gray very fine sandy loam in the lower part. The substratum to a depth of 62 inches is loamy fine sand. It is gray in the upper part and dark greenish gray in the lower part.

Permeability is moderate. This soil is very strongly acid or strongly acid unless lime has been added. The seasonal high water table is at or near the surface in undrained areas. This soil is subject to rare flooding.

Included with this soil in mapping are small areas of Perquimans, Portsmouth, and Roper soils. Most of the included soils are near the outer edge of the map unit delineation. The included soils make up about 10 percent of the map unit.

Most of this Weeksville soil is used as cropland; the rest is used mainly as woodland.

The major crops are corn, soybeans, and potatoes. Wetness is the main limitation (fig. 7). Conservation tillage, cover crops, and the inclusion of grasses and legumes in the crop rotation system help maintain organic matter and production. Wetness often delays

spring tillage and fall harvest. The lack of suitable outlets is a concern in the installation of drainage systems. This soil is well suited to pasture forages, such as fescue and ladino clover.

Wetness is the main limitation for woodland use and management. The dominant trees are baldcypress, pond pine, red maple, green ash, sweetgum, black tupelo, swamp tupelo, elm, yellow poplar, river birch, water oak, and willow oak. The understory plants include cedar, American holly, sweetbay, sourwood, reeds, and waxmyrtle.

Wetness is the main limitation for urban and recreation uses, and this soil is subject to rare flooding.

This Weeksville soil is in capability subclass IIIw. The woodland ordination symbol is 9W.

Prime Farmland

In this section, prime farmland is defined and discussed, and the prime farmland soils in Tyrrell County are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not subject to frequent flooding during the growing season. The slope ranges mainly from 0 to 2 percent.

The following map units, or soils, make up prime farmland in Tyrrell County. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Soils that have limitations, such as a high water table or flooding, may qualify as prime farmland if these limitations are overcome by such measures as drainage or flood control. In the following list, the measures needed to overcome the limitations of a map unit, if any, are shown in parentheses after the map unit name. Onsite evaluation is necessary to determine if the limitations have been overcome by the corrective measures.

AaA Altavista fine sandy loam, 0 to 2 percent slopes
At Augusta fine sandy loam (where drained)
StB State loamy fine sand, 0 to 4 percent slopes
To Tomotley fine sandy loam, rarely flooded (where drained)

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand, roadfill, and topsoil. They can use it to identify areas where wetness or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Steve Barnes, agronomist, First Colony Farms, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the North Carolina Agricultural Extension Service.

More that 66,000 acres was in crops and pasture in 1982, according to the 1982 Land Utilization Report. Of this, 500 acres was used as pasture and 65,062 acres was used for crops.

Tall fescue, white clover, and annual grasses, particularly rye and ryegrass, are the dominate pasture grasses and legumes. The acreage used as pasture has been consistent for 20 years.

Historically, farming has been Tyrrell County's principal enterprise, and it will continue to play an important role in the county's economy. Many of the soils are well suited to vegetable crops. The latest information on growing special crops can be obtained from local offices of the North Carolina Agricultural Extension Service or the Soil Conservation Service.

The soils suitable for farming can be divided into two major groups; those that have a light surface layer (typically brown to grayish brown) and those that have a dark surface layer (typically black to dark grayish brown). The soils that have a light surface layer commonly are on the higher landscapes adjacent to the Albemarle Sound. The soils that have a dark surface layer contain larger amounts of organic matter. They are commonly on the lower, wetter landscapes in the interior of the county (fig. 8).

Soils that have a light surface layer (typically brown to grayish brown). Farming started early on the dominantly sandy soils, which have a light surface layer and are well drained and moderately well drained. These soils are along the Albemarle Sound and are still extensively farmed.

Peanuts, corn, and soybeans are grown on the nearly level to gently sloping Altavista, Conetoe, and State soils. These soils are moderately well drained and well drained.

Soils that have a dark surface layer (typically black to dark grayish brown). In the survey area, soils that have a dark surface layer are called blackland soils. Some are very poorly drained mineral soils; for example, Arapahoe,

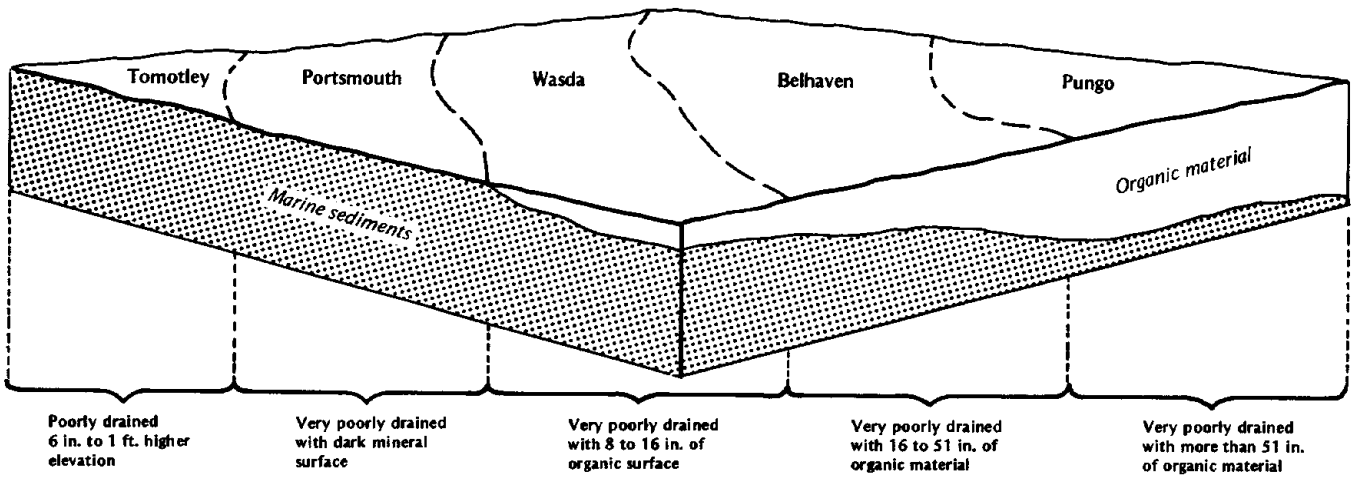

Tomotley
Portsmouth
Wasda
Belhaven
Pungo
Marine sediments
Organic material
Poorly drained 6 in. to 1 ft. higher elevation
Very poorly drained with dark mineral surface
Very poorly drained with 8 to 16 in. of organic surface
Very poorly drained with 16 to 51 in. of organic material
Very poorly drained with more than 51 in. of organic material

Figure 8.—Landscape relationship of selected mineral and organic soils.

Portsmouth, Hyde, and Cape Fear soils. Some are organic soils; for example, Belhaven, Dorovan, Ponzer, and Pungo soils. Some have an organic surface layer and mineral subsoil; for example, Wasda and Roper soils.

The Arapahoe, Portsmouth, Hyde, and Cape Fear soils generally were the first of the blackland soils to be used for farming. The main crops were corn, soybeans, small grains, and pasture grasses. Most of the other soils were in cutover forest or savannah swamp and were not used for crops until the 1950's. As a result of modern machinery, new technology, and a general increase in land value, most of these blackland soils have been developed rapidly for farming since the 1950's. The deep organic soils, however, are seldom used for farming. Dorovan soils that are in wet, wooded swamps have not been developed for farming. Since 1950, attempts were made to drain and clear some areas of Pungo soils but this soil is no longer used for farming. Because of wetness, these soils are not well suited to field crop production. Many logs, roots, and stumps are throughout the soil and a very hard, root-restricting layer forms when the soil is drained continuously.

Resource management systems applicable to the soils of Tyrrell County are described below. Onsite evaluation is needed to determine if a particular measure or component is ecologically desirable.

Field Drainage. Soils, such as Wasda and Ponzer soils, are more suited to development if drainage canals are installed. These soils require extensive drainage to provide plant roots at least a minimum of aerated soil in the upper layers. Such drainage requires a primary system of canals and a secondary system of field ditches in addition to surface shaping and leveling for farmland (fig. 9). Field ditches are generally 0.5 mile long and 200 to 330 feet apart for farming and about 600 feet or more apart for woodland.

Surface drainage is necessary to remove much of the excess water because most of the mineral and organic soils have very poor internal drainage. For a surface drainage system to be workable, the slope should be no more than 0.5 percent from the ditch upward toward the center of the field. Fields are smoothed to remove depressions that pocket excess surface water.

Canals that remove water adequately generally require a minimum drop of about 0.5 foot per mile. If the drop is less than this, pump drainage is necessary. The rate of waterflow in canals is generally less than 1.8 feet per second because of the low elevations and gentle relief throughout the county. The slow flow rates allow most of the sand- and silt-size sediment that erodes from the fields to settle in ditches and canals. Because of this settling, the sand and silt loads moving into the outlets and estuaries remain low during slow flow. The ditches and canals, however, require frequent cleaning.

Control of Erosion. Surface runoff from high-intensity rains may cause soil loss, even on fields that are nearly level. Most of the runoff occurs around hoedrains, or

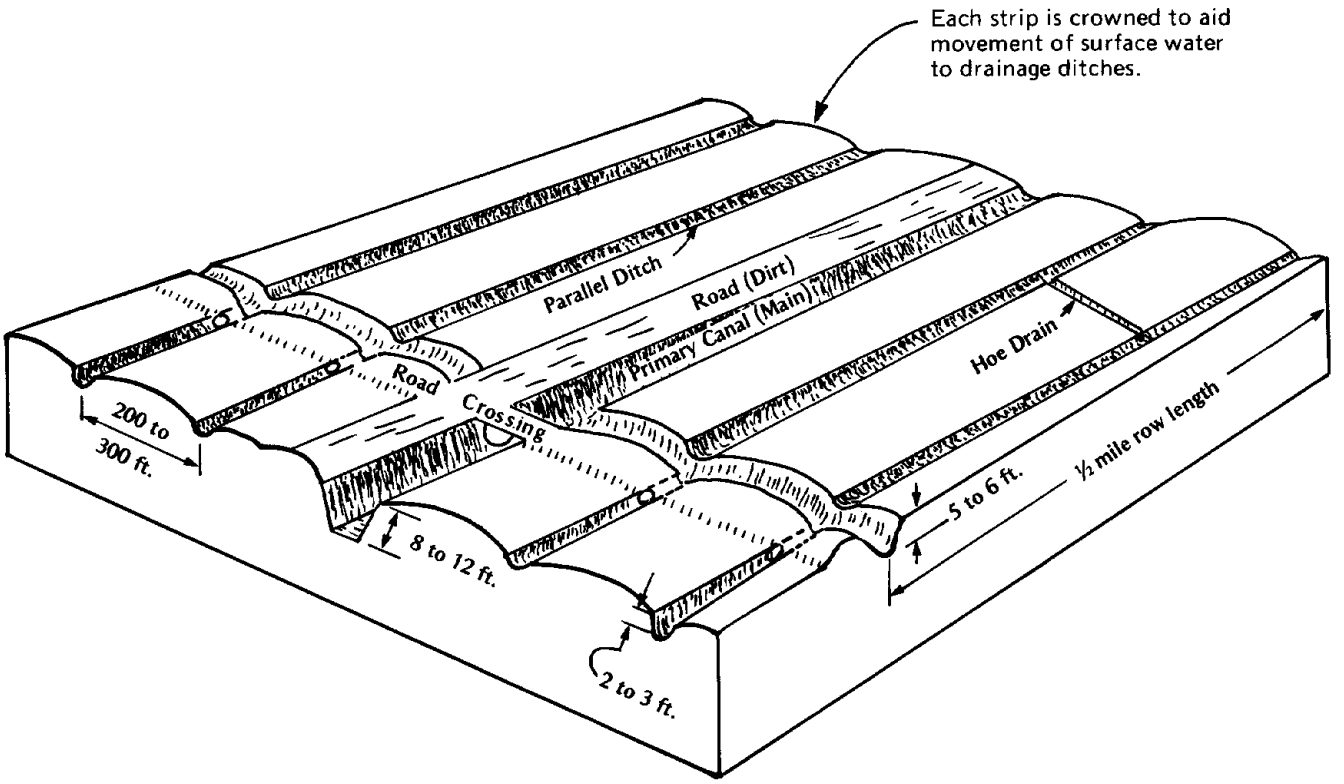

Each strip is crowned to aid movement of surface water to drainage ditches.
Parallel Ditch
Road (Dirt)
Primary Canal (Main)
Hoe Drain
Road Crossing
200 to 300 ft.
8 to 12 ft.
2 to 3 ft.
5 to 6 ft.
½ mile row length

Figure 9.—Artificial drainage systems commonly used in Tyrrell County.

cross drains, that are used across fields from ditch to ditch. The bulk of the eroded soil settles in the field ditches and canals, closing outlets and necessitating frequent and costly cleaning. Erosion can be reduced by field shaping and smoothing to reduce the number of cross drains, by conservation tillage, by crop residue management, and by stablizing ditch and canal banks with plant cover.

Soil blowing can occur if the soils are bare or free of surface roughness, or if the surface layer is dry. In some areas, windblown soil fills ditches and canals, reducing their effectiveness for drainage. Soil blowing on cropland is reduced by crop residue management and by using bedding. Bedding leaves the surface rough, lessening the probability of soil particles being picked up and moved across the surface when row direction is perpendicular to the wind. Windbreaks help to control soil blowing. To be most effective, they need to be perpendicular to the wind. The area of effective control is about 10 times the height of the windbreak. Windbreaks provide good wildlife habitat and add to the esthetics of large, cleared areas.

Other components of resource management systems that are effective in erosion control are field borders, winter cover crops, crop residue management, and conservation tillage.

Wind erosion can also be reduced by ditchbank management. Mowing only one side during the year will allow tall-growing plants to remain as a partial windbreak. The following year the opposite side can be mowed.

Liming of the Soil. All of the blackland soils are very strongly acid or extremely acid. They have a high lime requirement because they are high in organic matter content. Each ton of dry agricultural lime increases soil pH levels from 0.1 to 0.3 pH units. To attain the desired pH level for organic soils that have a pH of 5 in their natural state, 5 to 7 tons of lime per acre are required initially. The desired pH level of mineral soils that are high in organic matter is 5.3 to 5.5, and the initial lime requirement is 4 to 5 tons per acre. To maintain these pH levels, the lime needed generally is 1 ton per acre every 2 to 3 years. When applied the first time, the lime should be incorporated to a depth of 5 or 6 inches.

Because many of these soils have adequate magnesium, calcitic sources of lime are suitable. If soil tests indicate a lower magnesium level than is desirable, a dolomitic source of lime should be used. The soils that have a light surface layer also have a need for lime application. Lime should be applied according to soil tests.

Control of Plant Nutrient Levels. In their natural state, the soils of Tyrrell County generally have a low level of available plant nutrients; however, they do respond to and retain fertilizer nutrients. Available phosphorus is generally very low, and extra fertilizer is required for the first year of farming. After that, only phosphorus deficiencies indicated by soil tests need to be offset.

Potassium is generally low for the first year, but not as low as phosphorus. The content of organic matter and clay in the soils that have a dark surface layer enables them to retain potassium; thus, it is possible to attain good levels of this nutrient.

Nitrogen is a constituent of the organic matter, and some nitrogen is available for plant growth through the decomposition of the organic matter. If the dark surface soils become saturated at times of heavy rainfall, significant amounts of nitrogen are lost through denitrification. As a result, the amount of nitrogen required by crops is not significantly different from that required on mineral soils that have a light surface layer.

Some organic soils have deficiencies of such micronutrients as copper, manganese, zinc, and boron. In Tyrrell County, however, copper is the only micronutrient that is regularly deficient. When soils are initially cultivated, an application of 2.5 to 4 pounds of elemental copper per acre is needed. This application is adequate for about 3 years. Subsequent applications should be made according to soil tests. If windrows or stump piles are removed or the surface is reshaped during sloping and smoothing, the exposed soils generally need to be treated with copper and lime the same as when they are initially cultivated. If the soils are overlimed, deficiencies in zinc and manganese may occur. Once the soils are cultivated, lime and fertilizer need to be applied according to soil tests.

Because of their high moisture content and the insulating effect of organic matter, the organic blackland soils receive frost a few days later in spring and a few days earlier in the fall than the mineral soils in the same area. Therefore, planting dates for corn on the organic soils need adjustment to avoid potential frost damage. Early maturing varieties of soybeans are needed for late plantings to avoid potential damage by early frosts in fall. The rate of growth for corn seedlings is slow in the spring because of cool soil temperatures. Seedling growth is greatly increased if bands of fertilizer containing ammonium, nitrogen, and phosphorus are applied. This fertilizer contributes significantly to establishing strong, fast growing stands even in cold, wet springs.

Chemical Weed Control.

The use of herbicides for weed control on cropland is a common practice in Tyrrell county. Less tillage is required and herbicides are an integral part of modern farming. Soil properties, such as organic matter content and texture of the surface layer, affect the rate of herbicide application. Estimates for these properties were determined for the soils in this survey area. Table 14 shows a general range of organic matter content. The surface texture is shown in table 13 in the USDA texture column.

In some cases, the organic matter content of a soil may be outside the range shown in table 14. The organic matter content may be higher in soils that have received high amounts of animal or manmade waste. Soils that have recently been brought into cultivation may have a higher organic matter content in the surface layer than similar soils that have been in cultivation for a long time. Conservation tillage increases organic matter content in the surface layer. Lower levels of organic matter are common in soils where the surface layer has been partly or completely removed by erosion, land smoothing, or other activities. Current soil tests need to be used to measure organic matter content before determining required herbicide rates. The labels of herbicides show specific application rates based on organic matter content and texture of the surface layer.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that insures the smallest possible loss.

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. Nitrogen rates for corn on soils that have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds of nitrogen per acre. Where yield potential is only 100 bushels per acre, rates of 100 to 120 pounds of nitrogen per acre should be

used. Application of nitrogen in excess of potential yields generally is not a sound practice. Excess fertilizer can cause water pollution as well as an unnecessary expense. Where corn or cotton follow harvested soybeans or peanuts, nitrogen rates can be reduced 20 to 30 pounds per acre.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the North Carolina Agricultural Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major, and generally expensive, landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Tyrrell County does not have any class I, V, or VIII soils.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w* or *s,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); and *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

Woodland Management and Productivity

Edwin J. Young, forester, Soil Conservation Service, helped prepare this section.

Forest managers are faced with the challenge of producing greater yields from smaller areas of forest land. Meeting this challenge requires an intensity of management and silvicultural practices little dreamed of a few decades ago. Many of the silvicultural techniques applied in forestry resemble those long practiced in agriculture. The techniques include establishing, weeding, and thinning a desirable young stand; propagating more productive species and genetic varieties; providing short rotations and complete fiber utilization; controlling insects, diseases, and weeds; and increasing growth by fertilization and drainage. Even though timber crops require decades to grow, the goal of intensive management is similar to the goal of intensive agriculture—to produce the greatest yield of the most valuable crop as quickly as possible.

Commercial forests cover 159,053 *(12)* acres or about 61 percent of the land area of Tyrrell County. Commercial forest land is land that is producing or is capable of producing crops of industrial wood and is not withdrawn from timber utilization. Loblolly pine is the most important timber species in the county because it grows fast, is adapted to the soil and climate, brings the highest average sale value per acre, and is easy to establish and manage.

One of the first steps for intensively managing forest land is to determine the productive capacity of the soil for several tree species (fig. 10). The most productive and valued trees are then selected for each parcel of land. Site and yield information enables a forest manager to estimate future wood supplies. These estimates are the basis of realistic decisions concerning expenses and profits associated with intensive forest management, land acquisition, or industrial investments.

Figure 10.—Loblolly pine is the dominant timber species in Tyrrell County. This young stand is on Wasda muck, rarely flooded.

The productive capacity of forest lands depends on physiography, soil properties, climate, and the effects of past management. Specific soil properties and site characteristics, including soil depth, texture, structure, and depth to water table, affect forest productivity primarily by influencing available water capacity, aeration, and root development. The interaction of the soil properties and site characteristics determine site productivity. Other site factors, such as the amount of rainfall and length of growing season, also influence site productivity.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to fertilization than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special efforts to reforest. In the section "Detailed Soil Map Units," each map unit in the survey area suitable for producing timber presents information about productivity, limitations for harvesting timber, and management concerns for producing timber. The common forest understory plants are also listed. Table 6 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to

indicate the degree of the major soil limitations to be considered in forest management.

The first tree listed for each soil under the column "Common trees" is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

Table 6 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest. Cubic meters pr hectare can be converted to cubic feet per acre by multiplying by 14.3. It can be converted to board feet by multiplying by a factor of about 71. For example, an ordination symbol of 8 means the soil can be expected to produce 114 cubic feet per acre per year at the point where mean annual increment culminates, or about 568 board feet per acre per year.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *S* indicates a dry, sandy soil. The letter *A* indicates a soil that has no significant restrictions or limitations for forest use and management. If a soil has more than one limitation, the priority is W, then S.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation activities or harvesting operations expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of *moderate* or *severe* indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning of harvesting and reforestation operations, or use of specialized equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as wetness, or susceptibility of the surface layer to compaction. The rating is *slight* if equipment use is restricted by soil wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if soil wetness restricts equipment use from 2 to 6 months per year or if special equipment is needed to avoid or reduce soil compaction. The rating is *severe* if soil wetness restricts equipment use for more than 6 months per year or if special equipment is needed to avoid or reduce soil compaction. Ratings of *moderate* or *severe* indicate a need to choose the most suitable equipment and to carefully plan the timing of harvesting and other management operations.

Ratings of *seedling mortality* refer to the probability of death of naturally occurring or properly planted seedlings of good stock in periods of normal rainfall as influenced by kinds of soil or topographic features. *Seedling mortality* is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments and rooting depth. Mortality generally is greatest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of *moderate* or *severe* indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, or installing surface drainage.

The potential productivity of *common trees* on a soil is expressed as a *site index*. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate.

The soils that are commonly used to produce timber have the yield predicted in cubic feet. The yield is predicted at the point where mean annual increment culminates.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. This index applies to fully stocked, even-aged, unmanaged stands (3, 4, 5, 6, 7, 8, 9, and 12). The procedure and technique for determining site index are given in the site index tables used for the Tyrrell County soil survey.

The *productivity class* represents an expected volume produced by the most important trees, expressed in cubic feet per acre per year.

Trees to plant are those that are used for reforestation or, if suitable conditions exist, natural regeneration. They are suited to the soils and will produce a commercial wood crop. Desired product, topographic position (such as a low, wet area), and personal preference are three factors of many that can influence the choice of trees to use for reforestation.

Recreation

In table 7, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the

size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface absorbs rainfall readily but remains firm and is not dusty when dry.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is firm after rains and is not dusty when dry.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

John P. Edwards, biologist, Soil Conservation Service, helped prepare this section.

Tyrrell County has an abundance of good wildlife habitat and also medium to high populations of big game, small game, and waterfowl. Land use trends for the past 10 to 15 years, however, have had significant impact on the fish and wildlife resources.

Corn and soybeans are the main crops in the survey area. Many of the soils are highly productive if the land is cleared and adequate drainage systems are installed. The major soils converted from woodland to cropland are the Wasda, Argent, Arapahoe, Belhaven, Cape Fear, Portsmouth, Hyde, Perquimans, Ponzer, Roper, and Weeksville.

These soils have mostly been cleared or can be expected to be cleared within the next 5 to 10 years. In addition, efforts are being made to clear areas of Pungo soils. Many problems are associated with clearing and drainage of this soil (see Pungo muck, rarely flooded, in the section "Detailed Soil Map Units"), but conversion is still continuing at a rapid pace.

The effect that this large scale conversion has on fish and wildlife resources varies greatly and is dependent on many factors, such as the size of clearings, the presence or absence of windbreaks, whether or not the drainage system includes pumps, and if pumps are used where there are outlets. A general assumption is that the larger the clearings, the more adverse the effects on wildlife populations. In addition, direct outlets that expel large volumes of water into rivers and sounds are generally more detrimental to aquatic resources than gradual overland flows through swampy terrain (Dorovan and Chowan soils).

From a species evaluation standpoint, the black bear is most affected by the land clearing. Other wildlife, such as deer, quail, and rabbit, will not be as adversely affected, and such species as dove and migratory waterfowl can benefit. The total eventual impact on fish and wildlife depends largely on land use planning to insure that the fish and wildlife resource and the agricultural interest co-exist. Landusers can avoid an "either-or" situation by proper planning and decision making.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and

other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, and clover.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, panicgrass, and asters.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are rainbow plum, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, eastern red-cedar, and Atlantic white-cedar.

Wetland plants are annual and perennial, wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, and slope. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water control structures. Soil properties and features affecting shallow water areas are wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and

construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet, and because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to: evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the soil texture and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. Depth to a high water table and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to a high water table, flooding, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, and flooding affect absorption of the effluent.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent and surfacing of effluent, can affect public health. Ground water can be polluted if highly permeable sand is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, flooding, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a water table, slope, and flooding affect both types of landfill. Highly organic layers and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 11 gives information about the soils as a source of roadfill, sand, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand. The

ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by a high water table and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand. They have at least 5 feet of suitable material, low shrink-swell potential, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, and the depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10 and a high shrink-swell potential. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand is a natural aggregate suitable for commercial use with a minimum of processing. It is used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand are gradation of grain sizes (as indicated by the engineering classification of the soil) and the thickness of suitable material. Acidity and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or a layer of sand that is up to 12 percent silty fines. This material must be at least 3 feet thick. All other soils are rated as an improbable source.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope and a water table.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They have slopes of less than 8 percent, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, or soils that have only 20 to 40 inches of suitable material. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant-available nutrients as it decomposes.

Water Management

Richard D. Hinson, soil conservationist, Soil Conservation Service, helped prepare this section.

The soils of Tyrrell County vary considerably. The management of the surface and subsurface water is a major problem on most soils; however, some form of water management is essential because most of the soils are used for agricultural or forest production.

Soils differ as to the degree of water management that can be used and that is economically feasible to install. For any soil, the permeability and infiltration rates are important factors which determine the kind of drainage or irrigation system that can be installed.

Soils that have a loamy surface layer and subsoil, such as Portsmouth and Arapahoe soils, have the best potential for establishing subirrigation, overhead irrigation, and drainage control systems. The physical properties of these soils are conducive to the effectiveness of those systems, which generally results in lower installation and maintenance cost.

Soils that have a clayey subsoil, such as Cape Fear loam, have limited capabilities for subsurface irrigation systems, but will accommodate surface-applied irrigation and the use of systems to control the elevation of water in the ditches and soil profile. These soils require excellent surface drainage systems, such as precision land grading, to remove the excess surface water which

may be generated by irrigation or by controlled water levels.

Soils that have relatively thin organic layers, such as Belhaven soils, can support water management systems. The degree of water management is based on the selected site. In some instances these soils can accommodate subirrigation, overhead irrigation, and drainage control practices.

Soils that have relatively thick organic layers, such as Pungo soils, exhibit the least potential for water management practices. Numerous problems include buried trees and other stumps, the soil fertility and pH, the lack of soil stability and load bearing capacity, and the ability of the organic layers to transmit water for drainage or irrigation. These limitations generally prohibit the use of surface or subsurface irrigation systems; however, some response may be realized from drainage control. The degree of response can vary, depending upon the ability of the organic layers to transmit water and the condition of the surface water drainage system in the field.

All soils in Tyrrell County respond to some degree of water management. The crucial element is whether or not the response in yields can justify the cost for installation.

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage and terraces and diversions.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table and permeability of the aquifer.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, and subsidence of organic layers. Excavating and grading and the stability of ditchbanks are affected by slope and the hazard of cutbanks caving. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope and wetness affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 16.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as SP, SM, and SC; silty and clayey soils as ML, CL, MH, and CH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 16.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. In Tyrrell County, rock fragments larger than 3 inches are uncommon; therefore, this entry in table 13 is zero for all soils.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area, or from nearby areas, and on field examination.

Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The dual hydrologic group BD is given for certain wet soils that can be adequately drained. The first letter applies when a complete artificial drainage system is installed; the second letter to the undrained condition. Only soils that have a water table that affects runoff in the natural condition are assigned to a dual class.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as *none, rare,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely, thin strata of sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years (fig. 11). The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table, that is, *perched, artesian*, or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 15. The soils in Tyrrell County do not have a perched nor artesian high water table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

The two numbers in the "High water table-Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that the water table exists for less than a month.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 16 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by The North Carolina Department of Transportation, Division of Highways, Materials and Tests Unit.

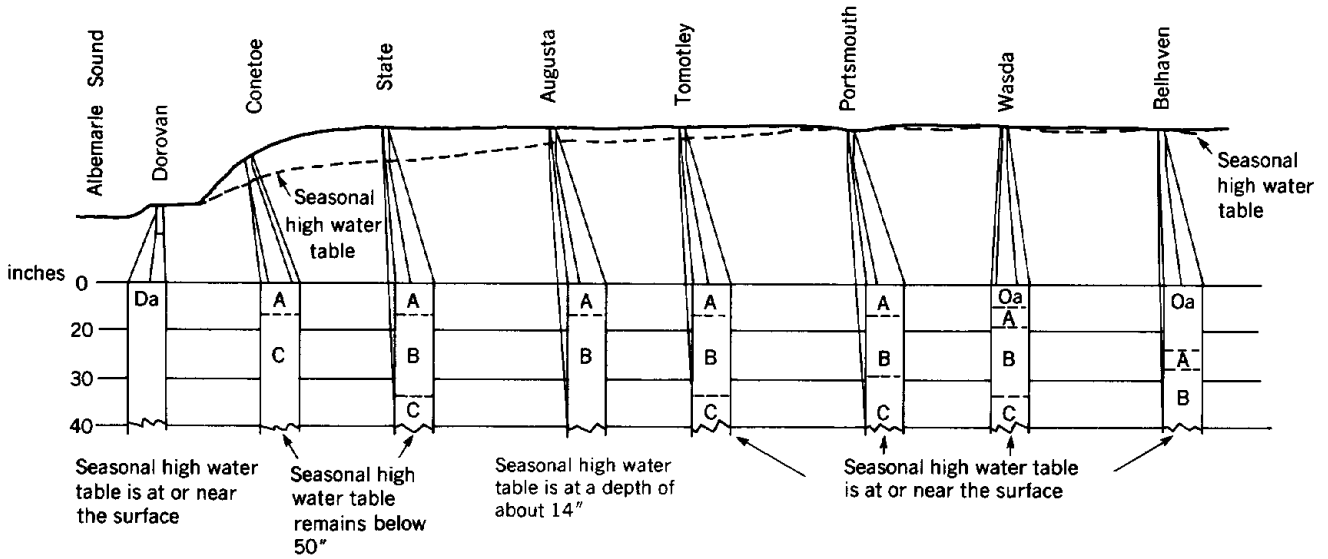


Figure 11.—Depth to the water table decreases in the transition from mineral soils in the northern part of the county to organic soils in the southern part of the county.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(11)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquult (*Aqu*, meaning water, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Ochraquults (*Ochr*, meaning presence of ochric epipedon, plus *aquults*, the suborder of the Ultisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Ochraquults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, thermic Typic Ochraquults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described (fig. 12). The detailed description of each soil horizon follows standards in the *Soil Survey Manual (10)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (11)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Altavista Series

The Altavista series consists of moderately well drained soils that formed in loamy marine and fluvial sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Altavista loamy fine sand, 0 to 2 percent slopes; about 4 miles north of Columbia, 0.1 mile west of the intersection of State Roads 1214 and 1209, about 0.2 mile north of State Road 1209 on a farm driveway (on east side of ditch), and 170 feet east of VEPCO pole GG26 in a cultivated field; (2,815,400X; 818,320Y):

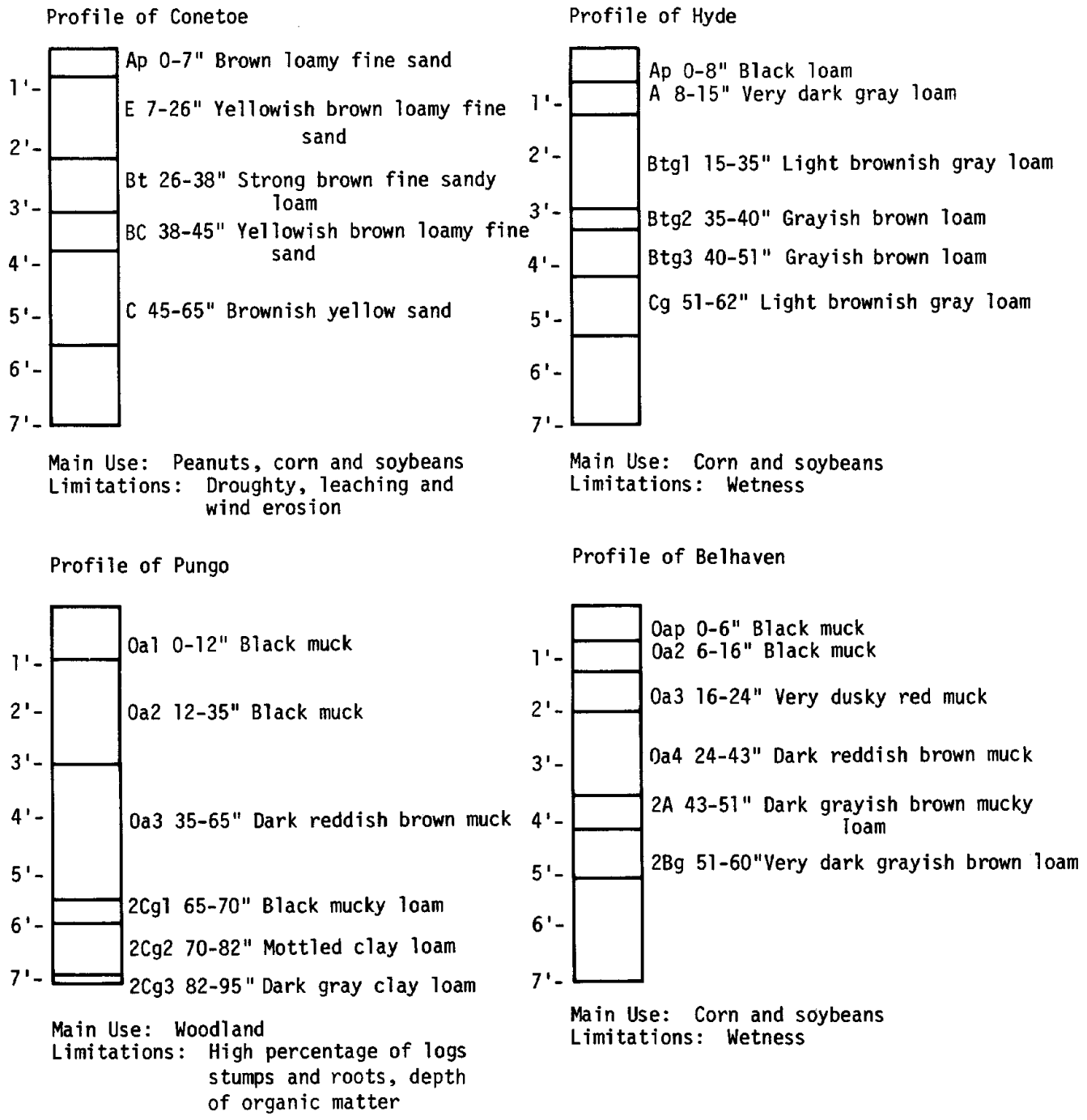

Profile of Conetoe
Ap 0-7" Brown loamy fine sand
E 7-26" Yellowish brown loamy fine sand
Bt 26-38" Strong brown fine sandy loam
BC 38-45" Yellowish brown loamy fine sand
C 45-65" Brownish yellow sand
1'-
2'-
3'-
4'-
5'-
6'-
7'-
Main Use: Peanuts, corn and soybeans
Limitations: Droughty, leaching and wind erosion
Profile of Hyde
Ap 0-8" Black loam
A 8-15" Very dark gray loam
Btg1 15-35" Light brownish gray loam
Btg2 35-40" Grayish brown loam
Btg3 40-51" Grayish brown loam
Cg 51-62" Light brownish gray loam
Main Use: Corn and soybeans
Limitations: Wetness
Profile of Pungo
Oa1 0-12" Black muck
Oa2 12-35" Black muck
Oa3 35-65" Dark reddish brown muck
2Cg1 65-70" Black mucky loam
2Cg2 70-82" Mottled clay loam
2Cg3 82-95" Dark gray clay loam
Main Use: Woodland
Limitations: High percentage of logs stumps and roots, depth of organic matter
Profile of Belhaven
Oap 0-6" Black muck
Oa2 6-16" Black muck
Oa3 16-24" Very dusky red muck
Oa4 24-43" Dark reddish brown muck
2A 43-51" Dark grayish brown mucky loam
2Bg 51-60"Very dark grayish brown loam
Main Use: Corn and soybeans
Limitations: Wetness

Figure 12.—Four contrasting soils in Tyrrell County are illustrated in a soil profile.

Ap—0 to 6 inches; dark brown (10YR 4/3) loamy fine sand; weak fine granular structure; very friable; common fine roots; few fine vesicular pores; slightly acid; abrupt wavy boundary.

E—6 to 10 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; very friable; common black opaque grains; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bt1—10 to 22 inches; yellowish brown (10YR 5/8) sandy clay loam; weak fine subangular blocky structure; friable; few faint yellowish brown (10YR 5/4) clay films on faces of peds; common fine vesicular

pores; common black opaque grains; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt2—22 to 37 inches; yellowish brown (10YR 5/6) sandy clay loam; common fine distinct light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; few faint yellowish brown (10YR 5/4) clay films on faces of peds; common fine vesicular pores; common black opaque grains; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt3—37 to 43 inches; yellowish brown (10YR 5/6) fine sandy loam; common fine distinct light gray (10YR 7/2) mottles; weak fine subangular blocky structure; friable; few faint gray (10YR 6/1) clay films on faces of peds; common black opaque grains; few fine flakes of mica; strongly acid; gradual wavy boundary.

C—43 to 60 inches; mottled yellowish brown (10YR 5/6) and light yellowish brown (2.5Y 6/4) sand; single grained; loose; many black opaque grains; few fine flakes of mica; medium acid.

Altavista soils have loamy horizons 30 to 60 inches thick. Mica flakes range from few to common throughout the profile. The reaction ranges from medium acid to very strongly acid except where lime has been added.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 4.

The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 or 6. The texture is loamy fine sand, loamy sand, sandy loam, or fine sandy loam. Some pedons do not have an E horizon.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. In some pedons, the lower part of the Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles in shades of red, brown, and gray range from few to many. The texture is commonly sandy clay loam or clay loam, but some pedons can have thin layers of fine sandy loam, sandy loam, loam, or loamy sand.

The C horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 to 8, or it is mottled in shades of gray, brown, or red. The texture is sand, loamy sand, sandy loam, or is stratified.

Arapahoe Series

The Arapahoe series consists of very poorly drained soils that formed in loamy fluvial and marine sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Arapahoe fine sandy loam, rarely flooded; about 3 miles north of Columbia; 0.8 mile south of the intersection of State Roads 1215 and 1214; 150 feet west of State Road 1214 in a pine plantation; (2,816,550X; 812,580Y):

Ap—0 to 12 inches; black (10YR 2/1) fine sandy loam; weak medium granular structure; very friable; strongly acid; clear smooth boundary.

Bg1—12 to 22 inches; grayish brown (10YR 5/2) fine sandy loam; common medium faint brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable; very strongly acid; clear smooth boundary.

Bg2—22 to 38 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable; strongly acid; clear smooth boundary.

Cg1—38 to 45 inches; light brownish gray (2.5Y 6/2) loamy fine sand; massive; very friable; medium acid; clear smooth boundary.

Cg2—45 to 62 inches; light gray (10YR 7/1) fine sand; common medium prominent strong brown (7.5YR 5/8) mottles and common medium distinct very pale brown (10YR 7/3) mottles; single grained; loose; medium acid.

Arapahoe soils have loamy horizons 24 to 45 inches thick. The reaction ranges from strongly acid to extremely acid in the surface layer and upper part of the control section except where lime has been added. The lower part of the control section and underlying horizons range from strongly acid to mildly alkaline.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2.

The Bg horizon has hue of 10YR or 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. Few to common mottles of high chroma are in some pedons. The texture is fine sandy loam, loam, or sandy loam.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. The texture is loamy fine sand, fine sand, loamy sand, and sand. Some pedons contain thin lenses of fine textures.

Argent Series

The Argent series consists of poorly drained soils that formed in loamy and clayey marine sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Argent silt loam, rarely flooded; about 4 miles west of Columbia; 0.2 mile east of the intersection of State Road 1113 and U.S. Highway 64; 100 feet north of U.S. Highway 64 in a cultivated field; (2,795,000X; 794,350Y):

Ap—0 to 6 inches; dark gray (10YR 4/1) silt loam; weak fine granular structure; friable; few fine roots; common fine flakes of mica; medium acid; abrupt smooth boundary.

Btg1—6 to 11 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine prominent brownish yellow (10YR 6/8) and strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable,

slightly sticky and slightly plastic; few very fine roots; common very fine vesicular pores; common fine flakes of mica; very strongly acid; clear wavy boundary.

Btg2—11 to 24 inches; gray (10YR 5/1) silty clay; common medium prominent strong brown (7.5YR 5/6) and brownish yellow (10YR 6/8) mottles; moderate fine angular blocky structure; firm, sticky and plastic; common very fine vesicular pores; few distinct dark gray (10YR 4/1) clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg3—24 to 35 inches; grayish brown (10YR 5/2) clay; common medium prominent strong brown (7.5YR 5/6) and brownish yellow (10YR 6/8) mottles; moderate coarse prismatic structure parting to moderate medium angular blocky; firm, sticky and plastic; common fine and medium roots; few very fine vesicular pores; few distinct dark gray (10YR 4/1) clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg4—35 to 48 inches; gray (10YR 5/1) silty clay; common medium prominent strong brown (7.5YR 5/6) mottles and common medium distinct light gray (10YR 7/1) mottles; moderate medium angular blocky structure; firm, sticky and plastic; common fine roots; common very fine vesicular pores; few distinct dark gray (10YR 4/1) clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg5—48 to 54 inches; light olive gray (5Y 6/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) and brownish yellow (10YR 6/6) mottles and common medium faint gray (5Y 6/1) mottles; weak medium angular blocky structure; firm, slightly sticky and slightly plastic; few faint olive gray (5Y 5/2) clay films on faces of peds; common fine flakes of mica; medium acid; gradual wavy boundary.

Cg—54 to 70 inches; light brownish gray (10YR 6/2) silt loam; common coarse distinct yellowish brown (10YR 5/8) and brownish yellow (10YR 6/6) mottles; massive; friable; many fine and medium flakes of mica; thin lenses of gray (10YR 6/1) silty clay; neutral.

The Argent soils have loamy and clayey horizons 35 to 55 inches thick. The reaction ranges from medium acid to extremely acid to a depth of 50 to 60 inches; below that it ranges from medium acid to mildly alkaline. Common to many fine and medium flakes of mica are throughout the profile.

The A horizon has hue of 10YR, value of 2 to 5, and chroma of 1 or 2.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. The Btg horizon commonly has mottles in shades of red, yellow, or brown. The texture is silty clay, silty clay loam, or clay.

The Cg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2, or it is neutral and has value of 5 to 7. It can have mottles in shades of red, yellow, gray, or brown. The texture is variable.

Augusta Series

The Augusta series consists of somewhat poorly drained soils that formed in loamy marine and fluvial sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Augusta fine sandy loam; about 4 miles north of Columbia; 0.1 mile west of the intersection of State Roads 1214 and 1209; 0.2 mile north of State Road 1209 on farm driveway; 25 feet west of yard in a cultivated field; (2,815,150X; 818,210Y):

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine roots and pores; few fine opaque grains; few fine flakes of mica; strongly acid; abrupt smooth boundary.

Bt1—6 to 10 inches; light olive brown (2.5Y 5/4) sandy clay loam; common fine distinct light brownish gray (2.5Y 6/2) mottles and common fine prominent yellowish red (5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots and pores; few faint olive brown (2.5Y 4/4) clay films on faces of peds; few black opaque grains; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt2—10 to 20 inches; light olive brown (2.5Y 5/4) clay loam; many medium distinct light brownish gray (2.5Y 6/2) mottles and common fine prominent yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint olive brown (2.5Y 4/4) clay films on faces of peds; few black opaque grains; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Btg1—20 to 31 inches; gray (5Y 6/1) sandy clay loam; common medium prominent strong brown (7.5YR 5/8) and yellowish brown (10YR 5/8) mottles and common fine prominent light yellowish brown (2.5Y 6/4) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint light brownish gray (2.5Y 6/2) clay films on faces of peds; few black opaque grains; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Btg2—31 to 49 inches; light gray (5Y 7/1) sandy clay loam, pockets of sandy loam; common medium prominent brownish yellow (10YR 6/6) and strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky; very few faint gray (5Y 6/1) clay films on faces of peds; few black

opaque grains; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Cg—49 to 62 inches; light gray (5Y 7/2) loamy sand; many medium distinct light yellowish brown (2.5Y 6/4) mottles and few fine prominent brownish yellow (10YR 6/8) mottles; massive; friable; few black opaque grains; few fine flakes of mica; very strongly acid.

Augusta soils have loamy horizons 40 to 70 inches thick. The reaction ranges from medium acid to very strongly acid unless lime has been added.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4.

Some pedons have an E horizon. It has hue of 10YR to 5Y, value of 6 or 7, and chroma of 2 to 4.

The Bt horizon has hue of 10YR to 2.5Y, value of 5 to 7, and chroma of 3 or 4. Mottles are few to many throughout the horizon. The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. The texture of the Bt and Btg horizons is commonly sandy clay loam or clay loam, but some pedons can have thin layers of fine sandy loam, sandy loam, or loamy sand.

The C horizon has hue of 10YR or 5Y, value of 5 to 8, and chroma of 1 or 2, or it is neutral and has value of 5 to 8. The texture is sand, loamy sand, or sandy loam.

Belhaven Series

The Belhaven series consists of very poorly drained organic soils that formed over loamy marine and fluvial sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Belhaven muck, rarely flooded; about 19 miles south of Columbia on North Carolina Highway 94; 2 miles west of North Carolina Highway 94 on Kilkenny Road; 1.7 miles north of Kilkenny Road on Indian Road; 50 feet east of Indian Road in a cultivated field; (2,818,000X; 712,180Y):

Oap—0 to 6 inches; black (5YR 2/1) broken face and rubbed muck; about 15 percent fibers, less than 1 percent rubbed; about 20 percent mineral content; weak fine subangular blocky structure; friable, slightly sticky; many fine roots and stems; about 5 percent wood fragments; few fine and medium pieces of charcoal; common coated and clean sand grains; strongly acid; abrupt smooth boundary.

Oa2—6 to 16 inches; black (5YR 2/1) broken face and rubbed muck; about 20 percent fibers, less than 1 percent rubbed; massive; friable, sticky, and pastelike; common fine roots; about 20 percent wood fragments; many fine pieces of charcoal; extremely acid; diffuse wavy boundary.

Oa3—16 to 24 inches; very dusky red (2.5YR 2/2) broken face and rubbed muck; about 20 percent fibers, less than 1 percent rubbed; massive; friable, sticky, and pastelike; few fine and medium roots; few clean sand grains; about 20 percent wood fragments; few medium pieces of charcoal; extremely acid; gradual wavy boundary.

Oa4—24 to 43 inches; dark reddish brown (5YR 2/2) broken face and rubbed muck; about 15 percent fibers, less than 1 percent rubbed; massive; friable, sticky, and pastelike; few fine roots; about 20 percent wood fragments; about 45 percent mineral material; extremely acid; diffuse wavy boundary.

2A—43 to 51 inches; dark grayish brown (10YR 4/2) mucky loam; massive, friable, slightly sticky and slightly plastic; many fine flakes of mica; very strongly acid; gradual wavy boundary.

2Bg—51 to 60 inches; very dark grayish brown (10YR 3/2) loam; massive; friable, sticky and slightly plastic; many fine flakes of mica; about 5 percent fibers; less than 1 percent rubbed; very strongly acid.

Belhaven soils have organic material that ranges in thickness from 16 to 51 inches. The organic horizons are extremely acid except where lime has been added. The underlying mineral horizons are extremely acid to slightly acid. Logs, stumps, and fragments of wood occupy 0 to 5 percent of the upper organic horizons in cleared areas that are cultivated and 5 to 35 percent in undrained areas. Pieces of charcoal range from common (2 to 8 percent) in the upper tier to few (less than 2 percent) in the lower tiers. Flakes of mica are few to common in the mineral horizons of most pedons.

The surface layer has hue of 5YR to 5Y, value of 2 or 3, and chroma of 1 or 2. The lower tiers of organic material have hue of 2.5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. Fiber content is 15 to 45 percent unrubbed and less than 10 percent rubbed. The amount of fiber is highest in the lower tier. Ten inches or more of the subsurface tier is in hue of 5YR or 2.5YR. The organic material of this layer is pastelike, has a greasy feel (collodial), and is massive under natural wet conditions. Upon aeration after drainage, structure of the organic material evolves. Excessive drying causes shrinkage and formation of hard subangular blocky peds that are very slow to rewet.

The 2A horizon has hue of 2.5YR to 5Y, value of 2 to 4, and chroma of 1 or 2. The texture is fine sandy loam, sandy loam, loam, or their mucky analogs. The soil is high in organic matter. Some pedons do not have a 2A horizon.

The 2Bg horizon has hue of 2.5YR to 5Y, value of 3 to 6, and chroma of 1 to 3. The texture is loam, clay loam, sandy clay loam, loamy sand, or sandy loam.

Cape Fear Series

The Cape Fear series consists of very poorly drained soils that formed in loamy and clayey fluvial and marine sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Cape Fear loam, rarely flooded; about 8 miles southwest of Columbia near New Lands; 1.1 miles southeast of the intersection of State Roads 1122 and 1105 to Phelps Road; 1.9 miles south to Northern Road; 0.1 mile east on Northern Road; 100 feet south in a cultivated field; (2,795,600X; 759,100Y):

Ap—0 to 11 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; friable; few fine roots; few fine flakes of mica; medium acid; abrupt wavy boundary.

Btg1—11 to 30 inches; dark grayish brown (10YR 4/2) clay; common fine distinct light olive brown (2.5Y 5/6) mottles; moderate fine angular blocky structure; firm, sticky and plastic; common fine vesicular pores; few distinct dark gray (10YR 4/1) clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual wavy boundary.

Btg2—30 to 40 inches; grayish brown (10YR 5/2) clay; common fine distinct light olive brown (2.5Y 5.6) mottles and common fine faint dark grayish brown mottles; moderate fine angular blocky structure; firm, sticky and plastic; few distinct gray (10YR 5/1) clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Btg3—40 to 50 inches; mottled gray (10YR 5/1), light olive gray (5Y 6/2), and olive (5Y 5/6) clay with pockets of sandy clay loam; weak fine angular blocky structure; firm, sticky and plastic; common fine flakes of mica; very strongly acid; gradual wavy boundary.

2Cg—50 to 62 inches; greenish gray (5GY 5/1) loamy sand; massive; friable; common flakes of mica; strongly acid.

The Cape Fear soils have loamy and clayey horizons 25 to 40 inches thick. The reaction ranges from very strongly acid to medium acid throughout except where lime has been added.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. The texture is clay, sandy clay, clay loam, or sandy clay loam. Most pedons contain few to common mottles of higher chroma.

The Cg or 2Cg horizon has hue of 10YR to 5Y or 5GY to 5BG, value of 4 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. The texture is variable.

Chowan Series

The Chowan series consists of poorly drained soils that have loamy mineral horizons that are underlain by highly decomposed organic material. Slope ranges from 0 to 2 percent.

Typical pedon of Chowan silt loam, frequently flooded; about 3 miles west of Columbia; 200 feet east of the intersection of State Roads 1112 and 1113; 200 feet north of State Road 1112 on a logging road; 100 feet east in a wooded swamp; (2,798,910X; 793,800Y):

A—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam; massive; friable, slightly sticky; common fine to coarse roots; extremely acid; clear smooth boundary.

Cg—6 to 25 inches; dark gray (10YR 4/1) silt loam; massive; friable, slightly sticky; few fine roots; very strongly acid; clear wavy boundary.

2Oa—25 to 70 inches; dark reddish brown (5YR 2/2) muck; about 25 percent fibers unrubbed, 5 percent rubbed; massive; very friable; common logs and stumps; about 20 percent mineral content; extremely acid.

The Chowan soils have mineral horizons that range in thickness from 16 to 40 inches. The underlying organic horizons range in thickness from 16 to more than 80 inches. The reaction ranges from extremely acid to medium acid in the mineral horizons and from extremely acid or very strongly acid in the organic horizon.

The A horizon has hue of 10YR to 5Y, value of 2 to 5, and chroma of 1 or 2. Where a horizon has value less than 3.5, the pedon is less than 10 inches thick.

The Cg horizon has hue of 10YR to 5Y, value of 2 to 5, and chroma of 1 or 2. The texture is loam, silt loam, silty clay loam, or mucky silt loam.

The 2Oa horizon has hue of 5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 3. It is sapric material 16 inches to several feet thick. Stumps and logs are common throughout the Oa horizon in most pedons.

Conetoe Series

The Conetoe series consists of well drained soils that formed in loamy and clayey marine and fluvial sediments. Slope ranges from 0 to 3 percent.

Typical pedon of Conetoe loamy fine sand, 0 to 3 percent slopes; about 3 miles west of Columbia; 1.1 miles north of U.S. Highway 64 at Travis on State Road 1200; 0.7 mile east of State Road 1200 on State Road 1205; about 0.2 mile north of the end of State Road 1205 on a dirt farm road; 300 feet west in a cultivated field; (2,796,880X; 800,420Y):

Ap—0 to 7 inches; dark brown (10YR 4/3) loamy fine sand; weak fine granular structure; very friable; many fine roots; many black opaque grains; common fine flakes of mica; slightly acid; abrupt smooth boundary.

E—7 to 26 inches; yellowish brown (10YR 5/6) loamy fine sand; weak fine granular structure; very friable; few fine roots; many black opaque grains; common fine flakes of mica; strongly acid; gradual wavy boundary.

Bt1—26 to 32 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine subangular blocky structure; very friable; few fine roots; few fine vesicular pores; sand grains coated and bridged with clay; many black opaque grains; common fine flakes of mica; strongly acid; clear wavy boundary.

Bt2—32 to 38 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine vesicular pores; few faint brown (7.5YR 5/4) clay films on faces of peds; many black opaque grains; common fine flakes of mica; strongly acid; clear wavy boundary.

BC—38 to 45 inches; yellowish brown (10YR 5/8) loamy fine sand; weak fine subangular blocky structure; very friable; many black opaque grains; common fine flakes of mica; strongly acid; gradual wavy boundary.

C—45 to 65 inches; brownish yellow (10YR 6/6) fine sand; common medium faint brownish yellow (10YR 6/8) mottles; very friable; many black opaque grains; common fine flakes of mica; medium acid.

In Conetoe soils, the combined thickness of the A and B horizons ranges from 30 to 60 inches. The reaction ranges from very strongly acid to medium acid in all horizons except where lime has been added.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 3.

The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 4 to 8. The texture is loamy fine sand, loamy sand, or fine sand.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 5 to 8. The texture typically is fine sandy loam or sandy loam, but some pedons have thin layers of sandy clay loam or loamy sand.

The BC horizon is similar in color to the Bt horizon. The texture is loamy sand or loamy fine sand. Some pedons do not have a BC horizon.

The C horizon has hue of 7.5YR to 10YR, value of 6 or 7, and chroma of 3 to 8. The texture is loamy sand, sand, or fine sand.

Dorovan Series

The Dorovan series consists of very poorly drained organic soils. The organic layers are more than 51 inches thick and are underlain by unconsolidated fluvial sediments. Slope is less than 1 percent.

Typical pedon of Dorovan muck, frequently flooded; about 3 miles northwest of Columbia; 0.7 mile west of the intersection of State Roads 1211 and 1212; 200 feet southwest of State Road 1211 in a wooded swamp; (2,797,900X; 810,130Y):

Oa1—0 to 30 inches; black (10YR 2/1) broken face and rubbed muck; about 20 percent fibers, less than 5 percent rubbed; massive; nonsticky; common medium and coarse roots; about 20 percent mineral content; slight sulfur odor; extremely acid; gradual wavy boundary.

Oa2—30 to 45 inches; black (5YR 2/1) broken face and rubbed muck; about 30 percent fibers, 5 percent rubbed; massive; nonsticky; common medium and coarse roots; about 20 percent mineral content; slight sulfur odor; extremely acid; gradual wavy boundary.

Oa3—45 to 90 inches; dark reddish brown (5YR 2/2) broken face and rubbed muck; about 20 percent fibers, 5 percent rubbed; massive; nonsticky; common medium and coarse roots; about 25 percent mineral content; slight sulfur odor; extremely acid.

In Dorovan soils the thickness of the organic material ranges from 51 to more than 80 inches. The reaction is very strongly acid or extremely acid in the organic layers and strongly acid or very strongly acid in the mineral layers. Logs and wood fragments occupy 0 to 5 percent of the organic layers. Organic layers are underlain by sandy, loamy, or clayey materials.

The Oa horizon has hue of 10YR to 5YR, value of 2 or 3, and chroma of 1 or 2. It contains 10 to 40 percent fiber unrubbed and less than one-sixth of the volume rubbed.

Some pedons have a 2Cg horizon that has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2. The texture is sand, sandy loam, loamy sand, loam, or clay.

Hyde Series

The Hyde series consists of very poorly drained soils that formed in loamy marine and fluvial sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Hyde loam, rarely flooded; about 7 miles south of Columbia; 1.1 miles west of the intersection of North Carolina Highway 94 and State Road 1307 on Northern Road; 0.1 mile south on a farm path; 100 feet east in a cultivated field; (2,823,970X; 766,200Y):

Ap—0 to 8 inches; black (10YR 2/1) loam; weak fine granular structure; friable; few fine and medium roots; extremely acid; clear smooth boundary.

A—8 to 15 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; friable; few medium roots; extremely acid; clear smooth boundary.

Btg1—15 to 35 inches; light brownish gray (2.5Y 6/2) loam; common fine distinct light olive brown (2.5Y 5/4) mottles and common fine prominent brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable, slightly sticky; few distinct grayish brown (2.5Y 5/2) clay films on faces of peds; common fine flakes of mica; extremely acid; clear smooth boundary.

Btg2—35 to 40 inches; grayish brown (10YR 5/2) loam; common fine prominent light olive brown (2.5Y 5/4) mottles; weak fine subangular blocky structure; friable, slightly plastic; few faint dark grayish brown (10YR 4/2) clay films on faces of peds; common fine flakes of mica; very strongly acid; clear smooth boundary.

Btg3—40 to 51 inches; grayish brown (2.5Y 5/2) loam; weak fine subangular blocky structure; friable; few faint dark grayish brown (2.5Y 4/2) clay films on faces of peds; common fine flakes of mica; strongly acid; clear smooth boundary.

Cg—51 to 62 inches; light brownish gray (2.5Y 6/2) loam; common fine distinct light olive brown (2.5Y 5/4) mottles and common fine distinct brownish yellow (10YR 6/8) mottles; massive; friable; common fine flakes of mica; strongly acid.

Hyde soils have loamy horizons that are 40 to more than 60 inches thick. The reaction ranges from extremely acid to strongly acid except where lime has been added.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2, or it is neutral and has a value of 2 or 3.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. Mottles in shades of brown and red are few to common. The texture is silty clay loam, loam, or clay loam.

The Cg horizon has hue of 10YR to 5Y or 5GY to 5BG, value of 4 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. The texture is variable.

Perquimans Series

The Perquimans series consists of poorly drained mineral soils that formed in loamy marine sediments. Slope ranges from 0 to 2 percent.

A typical pedon of Perquimans loam, rarely flooded; about 10 miles southeast of Columbia; 4.7 miles southeast of the end of State Road 1301 on a logging road; 100 feet north in woods; (2,860,150X; 778,900Y):

A—0 to 4 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; friable; common fine and medium roots; strongly acid; clear smooth boundary.

Eg—4 to 7 inches; light gray (10YR 7/2) loam; weak fine granular structure; friable; common fine and medium roots; strongly acid; clear smooth boundary.

Btg1—7 to 15 inches; light gray (10YR 7/1) loam; common medium prominent brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; common fine roots; few faint gray (10YR 6/1) clay films on faces of peds; strongly acid; clear smooth boundary.

Btg2—15 to 40 inches; gray (10YR 6/1) loam; common medium prominent brownish yellow (10YR 6/8) mottles and common fine prominent yellow (2.5Y 7/6) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint gray (10YR 5/1) clay films on faces of peds; many fine tubular pores; strongly acid; gradual wavy boundary.

Cg1—40 to 50 inches; light gray (10YR 7/1) loam; common medium prominent strong brown (7.5YR 5/8) mottles and few medium prominent yellowish red (5YR 5/8) mottles; massive; friable; common fine flakes of mica; strongly acid; gradual wavy boundary.

Cg2—50 to 65 inches; light gray (10YR 7/1) very fine sandy loam; common medium prominent strong brown (7.5YR 5/8) mottles and few medium prominent greenish gray (5G 5/1) and yellowish red (5YR 5/8) mottles; massive; friable; common fine flakes of mica; strongly acid.

Perquimans soils have loamy horizons that extend to a depth of 40 to more than 60 inches. The reaction ranges from very strongly acid to medium acid except where lime has been added.

The A horizon has hue of 10YR or 5Y, value of 2 to 6, and chroma of 1 or 2, or it is neutral and has value of 2 to 6. Where the value is 3 or less the horizon is less than 6 inches thick.

The Eg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. The texture is silt loam, loam, or very fine sandy loam. Some pedons do not have an Eg horizon.

Some pedons have an AB or BA horizon. It has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. The texture is loam, silt loam, or very fine sandy loam.

The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. Higher chroma mottles range from few to many. The texture is loam, silty clay loam, or clay loam, but can include thin layers of silt loam and sandy loam.

Some pedons have a BCg or CBg horizon. It has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. Higher chroma mottles range from few to many. The texture is loam, silt loam, sandy loam, or sandy clay loam.

The Cg horizon has hue of 10YR to 5Y, value of 5 to 8, and chroma of 1 or 2, or it is neutral and has value of 5 to 8. The texture is sandy or loamy, but some pedons contain thin strata of clay. Some pedons do not have a Cg horizon.

Ponzer Series

The Ponzer series consists of very poorly drained organic soils. The organic layers are 16 to 51 inches thick and are underlain by loamy marine and fluvial sediments. Slopes range from 0 to 2 percent.

Typical pedon of Ponzer muck, rarely flooded; about 8 miles southwest of Columbia near New Lands; 1.1 miles

southeast of the intersection of State Roads 1122 and 1105 to Phelps Road; 2.7 miles south to Parisher Road; 200 feet beyond Parisher Road; 50 feet west of Phelps Road in woods; (2,796,150X; 754,890Y):

Oap—0 to 10 inches; black (10YR 2/1) muck; less than 5 percent fiber, less than 1 percent rubbed; weak fine granular structure; friable; common fine roots and stems; extremely acid; gradual wavy boundary.

Oa2—10 to 30 inches; black (10YR 2/1) muck; about 15 percent fibers, less than 3 percent rubbed; massive; nonsticky; few fine and medium roots; extremely acid; clear smooth boundary.

2Cg1—30 to 55 inches; dark gray (10YR 4/1) clay loam; massive; friable, slightly sticky and slightly plastic; extremely acid; clear wavy boundary.

2Cg2—55 to 70 inches; greenish gray (5BG 6/1) sandy loam; common medium distinct gray (10YR 6/1) and yellowish brown (10YR 5/8) mottles; massive; friable; medium acid.

Ponzer soils have organic material to a depth of 16 to 51 inches. The organic material is extremely acid except where lime has been added. The underlying mineral horizons range from extremely acid to slightly acid. Logs, stumps, and fragments of wood occupy up to 10 percent of the organic layers in uncleared areas.

The Oa horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2, or it is neutral and has value of 2 or 3.

Fiber content of the organic layers is 5 to 25 percent unrubbed and less than 10 percent rubbed. The organic layers typically are massive under natural wet conditions. When drained and cultivated a granular or blocky structure develops in all parts of the organic layers, depending upon the nature and depth of the organic material as well as duration of drainage.

The 2Cg horizon has hue of 7.5YR to 5Y or 5GY to 5BG, value of 3 to 7, and chroma of 1 or 2, or it is neutral and has value of 3 to 7. The 2Cg horizon is loamy in the control section.

Portsmouth Series

The Portsmouth series consists of very poorly drained soils that formed in loamy marine and fluvial sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Portsmouth loam, rarely flooded; about 4 miles northeast of Columbia; 0.6 mile northeast of the intersection of State Roads 1218 and 1209 to logging road Yellow 4; 0.6 mile south on Yellow 4 to Yellow 2; 100 feet east of Yellow 4 and 15 feet north of Yellow 2 in a pine plantation; (2,829,280X; 819,150Y):

A—0 to 14 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; friable; common fine to medium roots; common fine flakes of mica; extremely acid; clear wavy boundary.

Btg1—14 to 30 inches; grayish brown (10YR 5/2) sandy clay loam; few fine prominent yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint dark grayish brown (10YR 4/2) clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual wavy boundary.

Btg2—30 to 35 inches; gray (10YR 6/1) sandy clay loam; few fine prominent yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint gray (10YR 5/1) clay films on faces of peds; common fine flakes of mica; very strongly acid; abrupt wavy boundary.

2Cg1—35 to 40 inches; light brownish gray (2.5Y 6/2) loamy sand; common medium distinct light yellowish brown (2.5Y 6/4) mottles and common medium prominent strong brown (7.5YR 5/8) mottles; massive; very friable; many fine flakes of mica; strongly acid; gradual wavy boundary.

2Cg2—40 to 65 inches; grayish brown (2.5Y 5/2) sand; common fine distinct gray (N6/0) mottles; massive; very friable; many fine flakes of mica; medium acid.

Portsmouth soils have loamy horizons that are 24 to 40 inches thick underlain by contrasting sandy horizons. The reaction of the A and B horizons ranges from extremely acid to strongly acid except where lime has been added. The C horizon ranges from extremely acid to medium acid. Flakes of mica and other weatherable minerals are few to common in most pedons.

The A horizon typically has hue of 10YR, value of 2 or 3, and chroma of 1 to 3, or it is neutral and has value of 2 or 3.

Some pedons have an E horizon. It has hue of 10YR or 5Y, value of 5 to 7, and chroma of 1 or 2. The texture is sandy loam, fine sandy loam, loam, or their mucky analogs.

The Btg horizon has hue of 10YR to 2.5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. Some pedons have mottles in shades of brown, yellow, and red. The texture is typically sandy clay loam, loam, or clay loam, but some pedons may have thin layers of sandy loam or loamy sand.

The 2Cg horizon has hue of 10YR to 5Y or 5GY to 5BG, value of 4 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. Some pedons have mottles in shades of brown and yellow. The texture is sand, loamy sand, fine sand, or loamy fine sand. Some pedons contain strata or pockets and lenses of sandy loam, clay loam, or sandy clay loam.

Pungo Series

The Pungo series consists of very poorly drained organic soils. The organic layers are more than 51

inches thick and are underlain by loamy marine and fluvial sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Pungo muck, rarely flooded; about 14 miles southwest of Columbia near Lake Phelps; 0.5 mile east of the end of State Road 1119 and a dirt road; 3.4 miles south of dirt road on farm path around eastern edge of Lake Phelps to a canal road; 2 miles east to another canal road; 0.5 mile south; 50 feet east of road; in woods; (2,779,480X; 734,280Y):

Oa1—0 to 12 inches; black (5YR 2/1) broken face and rubbed muck; about 10 percent fibers, less than 1 percent rubbed; weak medium granular structure; friable; few fine and medium roots; common fine and medium pieces of charcoal; common logs, stumps, and roots; extremely acid; clear smooth boundary.

Oa2—12 to 35 inches; black (5YR 2/1) broken face and rubbed muck; about 10 percent fibers, less than 1 percent rubbed; massive; sticky, muck material is pastelike and feels greasy when wet; few medium roots; few medium pieces of charcoal; many stumps, logs and roots; extremely acid; gradual smooth boundary.

Oa3—35 to 65 inches; dark reddish brown (5YR 3/2) broken face and rubbed muck; about 15 percent fibers, less than 2 percent rubbed; massive; sticky, muck material is pastelike and feels greasy; common medium roots; few medium pieces of charcoal; many stumps, logs, and roots; extremely acid; gradual smooth boundary.

2Cg1—65 to 70 inches; black (10YR 2/1) mucky loam; massive; friable; slightly sticky and slightly plastic; few fibers; few fine roots; very strongly acid; clear smooth boundary.

2Cg2—70 to 82 inches; mottled black (10YR 2/1) and dark grayish brown (10YR 4/2) clay loam; massive; friable, slightly sticky and slightly plastic; extremely acid; gradual smooth boundary.

2Cg3—82 to 95 inches; dark gray (10YR 4/1) clay loam; massive; firm, sticky and plastic; very strongly acid.

Pungo soils have organic deposits that range in thickness from 51 inches to more than 90 inches. The soil is extremely acid in the organic horizons except where lime has been added. The underlying mineral horizons are extremely acid to strongly acid. Logs, stumps, and roots occupy up to 35 percent of the surface area and subsurface volume. Unrubbed fiber content ranges from 2 to 60 percent throughout the profile. Rubbed fiber content of middle and lower tiers ranges up to 12 percent in some pedons. Charcoal content ranges from common in the surface layer to few in underlying layers.

The surface tier has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral and has value of 2 or 3. The subsurface and bottom tiers have hue of 2.5YR to 5Y, value of 2 or 3, and chroma of 1 to 4, or they are neutral and have value of 2 or 3. Ten inches or more of the subsurface tier is in hue of 5YR or 2.5YR. The organic material is massive and is pastelike or feels greasy when saturated. After drainage and subsidence, the organic material forms weak subangular blocky structure if allowed to aerate slowly. When this material dries over a short period of time, it shrinks and does not easily rewet unless crushed.

The 2Cg horizon has hue of 7.5YR to 5Y or 5GY to 5BG, value of 2 to 7, and chroma of 1 or 2, or it is neutral and has value of 2 to 7. The texture is clay loam, clay, silty clay, silty clay loam, sandy clay, loam, or mucky loam.

Roanoke Series

The Roanoke series consists of poorly drained soils that formed in clayey marine and fluvial sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Roanoke loam, rarely flooded; about 5 miles northwest of Columbia; 0.5 mile southeast of the intersection of State Roads 1200 and 1117; 0.2 mile south of State Road 1117 on a farm path; 150 feet southwest in a cultivated field; (2,784,100X; 798,600Y):

Ap—0 to 8 inches, dark grayish brown (10YR 4/2) loam; weak fine granular structure; friable; few fine roots; common fine flakes of mica, very strongly acid; clear smooth boundary.

Btg1—8 to 14 inches; grayish brown (10YR 5/2) loam; common fine faint light brownish gray mottles and common fine prominent yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky; few faint gray (10YR 5/1) clay films on faces of peds; few fine roots; common fine flakes of mica; very strongly acid; clear wavy boundary.

Btg2—14 to 35 inches; dark grayish brown (10YR 4/2) clay; common medium prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; few distinct dark gray (10YR 4/1) clay films on faces of peds; common fine flakes of mica; very strongly acid; clear wavy boundary.

Btg3—35 to 43 inches; mottled light brownish gray (10YR 6/2), yellowish brown (10YR 5/8), and light olive gray (5Y 6/2) loam; weak medium subangular blocky structure; friable, slightly sticky; common fine flakes of mica; very strongly acid; clear wavy boundary.

Cg—43 to 60 inches; light gray (2.5Y 7.2) fine sand with lenses of loam; few fine prominent yellowish brown (10YR 5/8) mottles; massive; very friable; common fine flakes of mica; strongly acid.

Roanoke soils have loamy and clayey horizons 35 to 55 inches thick. The reaction is very strongly acid or strongly acid except where lime has been added.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 or 2.

Some pedons have an E horizon. It has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. The texture is loam or fine sandy loam.

The Btg horizon has hue of 10YR to 2.5Y, value of 4 to 7, and chroma of 1 or 2. Mottles in shades of yellow and brown are common. The texture typically is clay, clay loam, or silty clay, but some pedons have thin layers of silty clay loam, loam, or sandy clay loam.

The Cg horizon has hue of 10YR to 5Y, or is 5GY to 5BG, value of 4 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. The texture is variable.

Roper Series

The Roper series consists of very poorly drained mineral soils that formed in loamy marine deposits under extremely wet conditions. Slope ranges from 0 to 2 percent.

Typical pedon of Roper muck, rarely flooded; about 8.5 miles south of Columbia; 0.4 mile north of First Colony Farms cattle corral number 1 on North Carolina Highway 94; 350 feet east of highway on Center Road in center of second cut; 2,600 feet north in a cultivated field; (2,832,720X; 759,600Y):

Oap—0 to 10 inches; black (10YR 2/1) broken face and rubbed muck; less than 1 percent fibers rubbed; weak fine granular structure; very friable; few fine roots; few fine pieces of charcoal; very strongly acid; clear wavy boundary.

A—10 to 14 inches; black (10YR 2/1) mucky silt loam; weak fine subangular blocky structure; friable, slightly sticky; many fine roots and root channels; common fine flakes of mica; very strongly acid; gradual wavy boundary.

Bg1—14 to 20 inches; very dark grayish brown (10YR 3/2) silty clay loam; weak fine subangular blocky structure; friable, slightly sticky; common fine roots and root channels; many fine flakes of mica; extremely acid; diffuse wavy boundary.

Bg2—20 to 44 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; many fine fibers; common medium vesicular pores; common medium root channels; many fine flakes of mica; very strongly acid; gradual wavy boundary.

2Cg1—44 to 51 inches; gray (10YR 6/1) silt loam that has lenses of loamy fine sand; massive; friable, slightly sticky; few fine roots; common medium vesicular pores; many fine flakes of mica; medium acid; clear wavy boundary.

2Cg2—51 to 60 inches; greenish gray (5GY 6/1) loamy sand that has lenses of silt loam; massive; friable; many fine flakes of mica; medium acid.

In Roper soils, the muck and silty material range in thickness from 40 to more than 60 inches. They are underlain by unconforming sandy sediments. The reaction ranges from extremely acid to strongly acid in the O, A, and B horizons and from medium acid to mildly alkaline in the C horizon. Few to common fine flakes of mica are throughout the mineral portion of the soil.

The Oa horizon has hue of 5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 4, or it is neutral and has value of 2 or 3. It has weak to moderate medium granular structure in undrained areas and weak or moderate medium subangular blocky structure in drained areas. The unrubbed fiber content ranges from 2 to 15 percent and the rubbed fiber content ranges from 0 to 4 percent. Charcoal fragments are common in the organic horizons of some pedons.

The A horizon has hue of 10YR to 5Y, value of 2 to 4, and chroma of 1 or 2, or it is neutral and has value of 2 to 4. The texture is silt loam, loam, clay loam, mucky silt loam, mucky loam, or silty clay loam. Some pedons do not have an A horizon.

The Bg horizon has hue of 10YR to 5Y or 5GY, value of 3 to 6, and chroma of 1 or 2, or it is neutral and has value of 3 to 6. Few to common mottles of higher chroma are in some pedons. The B horizon is silty clay loam or silt loam. Thin strata of loam, clay loam, or silty clay are in some pedons.

The 2Cg horizon has hue of 10YR to 5Y or 5GY to 5GB, value of 4 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. The texture is variable.

State Series

The State series consists of well drained soils that formed in loamy fluvial and marine sediments. Slope ranges from 0 to 4 percent.

Typical pedon of State loamy fine sand, 0 to 4 percent slopes; about 5 miles west of Columbia; 0.3 mile north of the intersection of State Roads 1200 and 1117; 100 feet east of State Road 1200 in a cultivated field; (2,782,100X; 801,500Y):

Ap—0 to 4 inches; brown (10YR 5/3) loamy fine sand; weak fine granular structure; very friable; few fine roots; few fine vesicular pores; common fine dark opaque grains; slightly acid; abrupt smooth boundary.

E—4 to 7 inches; pale brown (10YR 6/3) loamy fine sand; weak fine granular structure; friable; common fine roots; few fine vesicular pores; common fine dark opaque grains; neutral; clear smooth boundary.

Bt1—7 to 18 inches; strong brown (7.5YR 5/6) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky; common fine opaque grains, fine flakes of mica; few distinct brown (7.5YR 5/4) clay films on faces of peds; common fine dark

opaque grains; strongly acid; clear smooth boundary.
Bt2—18 to 35 inches; strong brown (7.5YR 5/8) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky; few fine flakes of mica; common fine dark opaque grains; few distinct brown (7.5YR 5/4) clay films on faces of peds; very strongly acid; gradual wavy boundary.
Bt3—35 to 42 inches; strong brown (7.5YR 5/8) sandy loam; weak fine subangular blocky structure; friable; many fine dark opaque grains; common fine flakes of mica; very strongly acid; gradual wavy boundary.
C1—42 to 58 inches; yellowish brown (10YR 5/8) loamy sand; massive; very friable; many fine dark opaque grains; many fine flakes of mica; very strongly acid; diffuse wavy boundary.
C2—58 to 80 inches; yellowish brown (10YR 5/8) fine sand; common medium prominent light yellowish brown (2.5Y 6/4) mottles; single grained; loose, friable; many fine flakes of mica; many fine dark opaque grains; very strongly acid.

State soils have loamy horizons 40 to 50 inches thick. The reaction is very strongly acid or strongly acid throughout the A and B horizons except where lime has been added and ranges from very strongly acid to medium acid in the C horizon.

The A horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 6.

The E horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 8. Some pedons do not have an E horizon.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. The texture typically is sandy clay loam or clay loam. Some pedons have thin layers of fine sandy loam or sandy loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. The texture is fine sand, sand, or loamy sand.

Tomotley Series

The Tomotley series consists of poorly drained soils that formed in loamy fluvial and marine sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Tomotley fine sandy loam, rarely flooded; about 3 miles northwest of Columbia; 0.3 mile south of the intersection of State Roads 1211 and 1209; 125 feet east of State Road 1209 in a cultivated field; (2,803,830X; 809,280Y):

Ap—0 to 8 inches; very dark gray (10YR 3/1) fine sandy loam; weak fine granular structure; very friable; common very fine to medium roots; common fine vesicular pores; few fine flakes of mica; slightly acid; clear smooth boundary.
Btg1—8 to 29 inches; gray (10YR 6/1) sandy clay loam; common fine prominent yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky; few fine roots; few faint grayish brown (10YR 5/2) clay films on faces of peds; few fine flakes of mica; common fine dark opaque grains; extremely acid; gradual wavy boundary.
Btg2—29 to 36 inches; light brownish gray (2.5Y 6/2) sandy loam, pockets and lenses of loamy sand; few fine prominent yellowish brown (10YR 5/8) and brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable; common fine flakes of mica; common fine dark opaque grains; strongly acid; gradual wavy boundary.
Cg—36 to 60 inches; light brownish gray (2.5Y 6/2) sand; many fine distinct light yellowish brown (2.5Y 6/4) mottles; single grained; loose; common fine dark opaque grains; very strongly acid.

Tomotley soils have loamy horizons 36 to 60 inches thick. The reaction ranges from extremely acid to strongly acid in the upper part except where lime has been added. The reaction ranges from extremely acid to medium acid below a depth of about 50 inches.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2.

Some pedons have an E horizon. It has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. The texture is fine sandy loam, sandy loam, or loam.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. Mottles in shades of gray, olive, yellow, brown, or red range from few to many. The texture is typically sandy clay loam or clay loam, but some pedons can have thin layers of sandy loam, fine sandy loam, or loamy sand.

The Cg horizon has hue of 10YR to 2.5Y, value of 5 to 7, and chroma of 1 or 2. The Cg horizon is mottled in various shades of red, olive, yellow, brown, or gray. The texture is variable.

Wahee Series

The Wahee series consists of somewhat poorly drained soils that formed in clayey marine and fluvial sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Wahee loam, 0 to 3 percent slopes; about 5 miles west of Columbia; 0.5 mile east of the intersection of State Roads 1200 and 1117; 350 feet north of State Road 1117; in a cultivated field; (2,784,300X; 799,600Y):

Ap—0 to 5 inches; grayish brown (10YR 5/2) loam; weak medium granular structure; very friable; neutral; clear smooth boundary.
Bt—5 to 12 inches; very pale brown (10YR 7/4) clay loam; common medium distinct light gray (10YR 7/1) mottles and common medium prominent reddish yellow (7.5YR 6/8) mottles; moderate

medium subangular blocky structure; friable, slightly sticky and slightly plastic; few distinct pale brown (10YR 6/3) clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg1—12 to 20 inches; light gray (10YR 7/1) clay; common medium prominent reddish yellow (7.5YR 6/8) mottles, few medium prominent yellow (10YR 7/6) and light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few distinct gray (10YR 6/1) clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg2—20 to 32 inches; gray (10YR 6/1) clay; common medium prominent brownish yellow (10YR 6/8) and reddish yellow (7.5YR 6/8) mottles and few medium faint light gray (10YR 7/1) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common distinct grayish brown (10YR 5/2) clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg3—32 to 40 inches; light gray (10YR 7/1) clay loam; common medium faint light brownish gray (10YR 6/2) mottles, common medium prominent reddish yellow (7.5YR 6/8) and olive yellow (2.5Y 6/6) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; few distinct gray (10YR 6/1) clay films on faces of peds; very strongly acid; clear smooth boundary.

BCg—40 to 48 inches; light gray (10YR 7/1) sandy loam with lenses of sandy clay loam; common medium prominent brownish yellow (10YR 6/8) and yellow (10YR 7/6) mottles; weak medium subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

Cg—48 to 60 inches; light gray (10YR 7/2) loamy sand; few fine faint light gray mottles; massive; friable; very strongly acid.

Wahee soils have loamy and clayey horizons 40 to 60 inches thick. The reaction is strongly acid or very strongly acid except where lime has been added.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 3.

The upper part of the Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 7. Mottles have chroma of 2 or less. The middle and lower parts of the Bt horizon have hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. The texture of the Bt horizon typically is clay or clay loam, but some pedons have thin layers of sandy clay loam or silty clay loam.

The BCg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. The texture is sandy loam, loam, sandy clay loam, or clay loam. This horizon commonly has strata or pockets of contrasting textures. Some pedons have a CBg horizon that has similar colors and textures as the BCg horizon.

The Cg horizon has hue of 10YR or 5Y, value of 5 to 7, and chroma of 1 or 2. Mottles in shades of red, brown, and yellow are in some pedons. The texture is variable.

Wasda Series

The Wasda series consists of very poorly drained mineral soils that formed in loamy marine sediments under very wet conditions. Slope ranges from 0 to 2 percent.

Typical pedon of Wasda muck, rarely flooded; 3 miles northeast of Columbia; 0.6 mile south of the intersection of State Roads 1216 and 1214; 1.2 miles east of State Road 1214 on logging road Blue 1; 0.5 mile south on Yellow 5; 0.3 mile east on spur 2; 100 feet south of spur 2 in a pine plantation; (2,823,950X; 807,940Y):

Oa—0 to 15 inches; black (10YR 2/1) muck; about 10 percent fiber, 2 percent rubbed; weak medium granular structure; very friable; many fine and medium roots; few clean sand grains; few fine pieces of charcoal; extremely acid; clear smooth boundary.

A—15 to 25 inches; very dark gray (10YR 3/1) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky; common fine roots; common fine flakes of mica; very strongly acid; clear wavy boundary.

Bg1—25 to 33 inches; grayish brown (2.5Y 5/2) sandy clay loam; few fine prominent yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable, slightly sticky; few fine roots; common fine flakes of mica; extremely acid; clear wavy boundary.

Bg2—33 to 42 inches; grayish brown (10YR 5/2) sandy loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable, few fine roots; common fine flakes of mica; medium acid; clear wavy boundary.

2Cg—42 to 65 inches; light gray (10YR 7/2) sand, lenses of loamy sand; few medium prominent strong brown (7.5YR 5/6) mottles; massive; friable; common fine flakes of mica; medium acid.

The muck and loamy horizons, underlain by sediments, are from 40 inches to more than 60 inches thick. The reaction ranges from extremely acid to strongly acid in the upper part of the control section and from medium acid to mildly alkaline in the lower part and in the C horizon. Mica is common in the B and C horizons.

The Oa horizon has hue of 2.5YR to 5Y, value of 2 or 3, and chroma of 1 or 2, or it is neutral and has value of 2 or 3.

The A horizon has hue of 10YR to 5Y, value of 2 to 7, and chroma of 1 or 2.

The Bg horizon has hue of 10YR to 5Y, value of 2 to 7, and chroma of 1 or 2. Few to common mottles are in the middle and lower parts of the Bg horizon of some pedons. The texture of the Bg horizon commonly is clay loam but ranges to sandy loam or sandy clay loam. Thin lenses of sand and clay are common.

The 2Cg horizon has hue of 10YR, 2.5Y, 5Y, 5GY, 5G, or 5BG, value of 5 to 7, and chroma of 1 or 2, or it is neutral and has value of 5 to 7. The texture is variable.

Weeksville Series

The Weeksville series consists of very poorly drained soils that formed in loamy marine and fluvial sediments. Slope ranges from 0 to 2 percent.

Typical pedon of Weeksville silt loam, rarely flooded; about 12 miles south of Columbia; 3 miles south of First Colony Farms cattle corral number 1 on North Carolina Highway 94; 0.4 mile east of the highway in seventh cut; 110 feet north of the center of Poplar Road in a cultivated field; (2,838,700X; 741,200Y):

Ap—0 to 13 inches; black (10YR 2/1) silt loam; weak fine granular structure; friable; few fine roots; few fine vesicular pores; common fine flakes of mica; very strongly acid; clear wavy boundary.

Bg1—13 to 26 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable, slightly sticky; few fine roots; few fine vesicular pores; common flakes of mica; very strongly acid; gradual wavy boundary.

Bg2—26 to 36 inches; light brownish gray (10YR 6/2) very fine sandy loam; common fine prominent strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky; common fine flakes of mica; very strongly acid; gradual wavy boundary.

Bg3—36 to 42 inches; light brownish gray (10YR 6/2) very fine sandy loam; common fine distinct yellowish brown (10YR 5/6) mottles and common medium prominent pinkish gray (5YR 6/2) mottles; weak fine subangular blocky structure; friable, slightly sticky; common fine flakes of mica; very strongly acid; gradual wavy boundary.

2Cg1—42 to 50 inches; gray (5Y 5/1) loamy fine sand; few fine prominent yellowish brown (10YR 5/8) mottles; massive; friable; common fine flakes of mica; very strongly acid; diffuse wavy boundary.

2Cg3—50 to 62 inches; dark greenish gray (5GY 4/1) loamy fine sand; common medium prominent olive (5Y 5/4) mottles and few fine prominent yellowish brown (10YR 5/8) mottles; massive; friable; common fine flakes of mica; very strongly acid.

Weeksville soils have loamy horizons 36 to 60 inches thick. The reaction is strongly acid or very strongly acid. Few to common fine flakes of mica are throughout the profile.

The A horizon has hue of 10YR to 5Y, value of 2 or 3, and chroma of 1 or 2, or it is neutral and has value of 2 or 3.

The Bg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral and has value of 4 to 7. Mottles in shades of brown or yellow are in some pedons. The texture is very fine sandy loam, silt loam, or loam.

The 2Cg horizon has hue of 10YR, 2.5Y, 5Y, 5GY, or 5BG, value of 4 to 8, and chroma of 1 or 2, or it is neutral and has value of 4 to 8. The texture is sand, loamy fine sand, loamy sand, and fine sand. Some pedons contain thin layers and pockets of fine textures.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

	Inches/inch (in tables)
Very low	0.00 to 0.05
Low	0.05 to 0.10
Moderate	0.10 to 0.15
High	0.15 to 0.20
Very high	more than 0.20

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow.

Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Fine textured soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

No-till planting. A method of planting crops with no seed bed preparation except when opening a thin slice of the soil and placing the seed at the desired depth.

Organic matter. Plant and animal residue in the soil in various stages of decompositon.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10

square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor outlets (in tables). In these areas, surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake (in tables). The slow movement of water into the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0

Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Sand.—Soil material that contains 85 percent or more sand; the percentage of silt plus 1-1/2 times the percentage of clay does not exceed 15.

Loamy sand.—Soil material that contains at the upper limit 85 to 90 percent sand, and the percentage of silt plus 1-1/2 times the percentage of clay is not less than 15; at the lower limit it contains not less than 70 to 85 percent sand, and the percentage of silt plus twice the percentage of clay does not exceed 30.

Sandy loam.—Soil material that contains either 20 percent clay or less and the percentage of silt plus twice the percentage of clay exceeds 30, and 52 percent or more sand; or less than 7 percent clay, less than 50 percent silt, and between 43 and 52 percent sand.

Loam.—Soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Silt loam.—Soil material that contains 50 percent or more silt and 12 to 27 percent clay (or) 50 to 80 percent silt and less than 12 percent clay.

Silt.—Soil material that contains 80 percent or more silt and less than 12 percent clay.

Sandy clay loam.—Soil material that contains 20 to 35 percent clay, less than 28 percent silt, and 45 percent or more sand.

Clay loam.—Soil material that contains 27 to 40 percent clay and 20 to 45 percent sand.

Silty clay loam.—Soil material that contains 27 to 40 percent clay and less than 20 percent sand.

Sandy clay.—Soil material that contains 35 percent or more clay and 45 percent or more sand.

Silty clay.—Soil material that contains 40 percent or more clay and 40 percent or more silt.

Clay.—Soil material that contains 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Well graded. Refers to soil material consisting of course grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. This contrasts with poorly graded soil.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data recorded in the period 1951-79 at Plymouth, North Carolina]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	53.5	30.7	42.1	77	9	47	4.10	2.32	5.68	8	1.3
February---	55.9	32.3	44.1	79	11	51	4.02	2.45	5.42	8	1.6
March------	63.4	38.6	51.0	85	20	138	4.10	2.80	5.27	8	.7
April------	73.8	46.6	60.2	91	27	306	3.09	1.92	4.14	6	.0
May--------	80.1	55.2	67.7	94	35	549	4.76	2.46	6.76	8	.0
June-------	86.0	62.5	74.3	97	45	729	4.58	2.37	6.51	7	.0
July-------	89.0	66.9	78.0	98	51	868	6.39	3.56	8.89	9	.0
August-----	88.1	66.3	77.2	97	50	843	6.00	2.60	8.89	8	.0
September--	82.9	60.7	71.8	94	42	654	4.68	2.31	6.74	6	.0
October----	73.6	49.5	61.6	89	26	360	3.33	1.22	5.08	5	.0
November---	65.0	39.8	52.4	83	20	123	3.10	1.40	4.55	6	.0
December---	56.5	32.8	44.7	77	12	62	3.36	1.90	4.64	7	.6
Yearly:											
Average--	72.3	48.5	60.4	---	---	---	---	---	---	---	---
Extreme--	---	---	---	99	7	---	---	---	---	---	---
Total----	---	---	---	---	---	4,730	51.51	45.39	57.44	86	4.2

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 °F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data recorded in the period 1951-79
at Plymouth, North Carolina]

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 1	April 15	April 29
2 years in 10 later than--	March 24	April 9	April 24
5 years in 10 later than--	March 10	March 30	April 15
First freezing temperature in fall:			
1 year in 10 earlier than--	October 29	October 24	October 11
2 years in 10 earlier than--	November 4	October 29	October 16
5 years in 10 earlier than--	November 16	November 9	October 25

TABLE 3.--GROWING SEASON

[Data recorded in the period 1951-79
at Plymouth, North Carolina]

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	221	199	173
8 years in 10	231	207	180
5 years in 10	251	224	192
2 years in 10	270	240	205
1 year in 10	280	249	211

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AaA	Altavista loamy fine sand, 0 to 2 percent slopes	3,570	0.9
Ap	Arapahoe fine sandy loam, rarely flooded	1,885	0.5
Ar	Argent silt loam, rarely flooded	3,930	1.0
At	Augusta fine sandy loam	5,235	1.4
Ba	Belhaven muck, rarely flooded	19,335	5.1
Cf	Cape Fear loam, rarely flooded	8,140	2.1
Ch	Chowan silt loam, frequently flooded	2,085	0.5
CtA	Conetoe loamy fine sand, 0 to 3 percent slopes	1,100	0.3
Do	Dorovan muck, frequently flooded	25,580	6.7
Hy	Hyde loam, rarely flooded	21,830	5.7
Pe	Perquimans loam, rarely flooded	8,615	2.2
Po	Ponzer muck, rarely flooded	7,690	2.0
Pt	Portsmouth loam, rarely flooded	13,630	3.6
Pu	Pungo muck, rarely flooded	84,784	22.1
Ro	Roanoke loam, rarely flooded	2,050	0.5
Rp	Roper muck, rarely flooded	16,045	4.2
StB	State loamy fine sand, 0 to 4 percent slopes	1,235	0.3
To	Tomotley fine sandy loam, rarely flooded	14,935	3.9
Ud	Udorthents, loamy	75	*
WaA	Wahee loam, 0 to 3 percent slopes	435	0.1
Wd	Wasda muck, rarely flooded	3,745	1.0
Wk	Weeksville silt loam, rarely flooded	14,435	3.8
	Water	122,778	32.1
	Total	383,142	100.0

* Less than 0.1 percent.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management, and for the soils that need drainage the yields are for the drained condition. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Land capability	Corn	Soybeans	Potatoes	Wheat	Improved bermudagrass
		Bu	Bu	Cwt	Bu	AUM*
AaA--- Altavista	IIw	130	45	---	55	9.0
Ap--- Arapahoe	IIIw	130	40	250	50	10.0
Ar--- Argent	IIIw	140	45	---	50	---
At--- Augusta	IIIw	110	40	---	50	---
Ba--- Belhaven	IVw	130	40	---	55	---
Cf--- Cape Fear	IIIw	140	45	---	50	11.0
Ch--- Chowan	VIIw	---	---	---	---	---
CtA--- Conetoe	IIs	75	25	---	---	9.0
Do--- Dorovan	VIIw	---	---	---	---	---
Hy--- Hyde	IIIw	150	50	330	55	14.0
Pe--- Perquimans	IIIw	135	45	330	55	12.0
Po--- Ponzer	IVw	150	45	---	55	7.5
Pt--- Portsmouth	IIIw	130	45	285	60	10.0
Pu--- Pungo	VIIw	---	---	---	---	---
Ro--- Roanoke	IIIw	140	40	---	45	7.0
Rp--- Roper	IIIw	160	45	---	55	10.0
StB--- State	IIe	120	40	---	60	9.0
To--- Tomotley	IIIw	135	40	---	50	---
Ud. Udorthents						

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Potatoes	Wheat	Improved bermudagrass
		Bu	Bu	Cwt	Bu	AUM*
WaA---------- Wahee	IIw	110	45	---	45	---
Wd---------- Wasda	IIIw	130	45	---	55	12.0
Wk---------- Weeksville	IIIw	150	55	285	55	12.0

* Animal Unit Month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
AaA---------- Altavista	9W	Slight	Moderate	Slight	Loblolly pine--------	91	133	Loblolly pine, hardwoods 2/.
					Sweetgum----------	84	90	
					White oak----------	---	---	
					Red maple----------	---	---	
					Yellow-poplar--------	---	---	
					Southern red oak-----	---	---	
					Northern red oak-----	---	---	
					Water oak----------	---	---	
					Black tupelo---------	---	---	
					Elm-----------------	---	---	
					Hickory-------------	---	---	
					American beech-------	---	---	
					Willow oak----------	---	---	
					Post oak-----------	---	---	
Ap---------- Arapahoe	10W	Slight	Severe	Severe	Loblolly pine--------	95	142	Loblolly pine 1/, hardwoods 2/.
					Sweetgum----------	---	---	
					Red maple----------	---	---	
					Water tupelo---------	---	---	
					Baldcypress----------	---	---	
					Pond pine----------	---	---	
					Yellow-poplar--------	---	---	
					Blackgum-----------	---	---	
					Willow oak----------	---	---	
					Swamp chestnut oak---	---	---	
					Water oak----------	---	---	
					Green ash----------	---	---	
					Black tupelo---------	---	---	
					Swamp tupelo---------	---	---	
					Elm-----------------	---	---	
					River birch----------	---	---	
Ar---------- Argent	10W	Slight	Severe	Moderate	Loblolly pine--------	96	145	Loblolly pine, hardwoods 2/.
					Sweetgum----------	96	125	
					Water oak----------	96	93	
					Water tupelo---------	---	---	
					Yellow-poplar--------	---	---	
					Red maple----------	---	---	
					Green ash----------	---	---	
					Hickory-------------	---	---	
					Elm-----------------	---	---	
					Willow oak----------	---	---	
At---------- Augusta	9W	Slight	Moderate	Slight	Loblolly pine--------	90	131	Loblolly pine, hardwoods 2/.
					Sweetgum----------	90	106	
					American sycamore----	90	98	
					White oak----------	80	62	
					Southern red oak-----	80	62	
					Water oak----------	---	---	
					Shortleaf pine-------	---	---	
					Red maple----------	---	---	
					Yellow poplar--------	---	---	
					Willow oak----------	---	---	
					Black cherry---------	---	---	
					American birch-------	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
Ba Belhaven	6W	Slight	Severe	Severe	Loblolly pine Pond pine Baldcypress Atlantic white-cedar Red maple Sweetgum Blackgum	65 60 --- --- --- --- ---	85 39 --- --- --- --- ---	Loblolly pine 1/.
Cf Cape Fear	11W	Slight	Severe	Severe	Loblolly pine Sweetgum Water oak Water tupelo Baldcypress Pond pine Red maple Green ash Hickory Swamp tupelo Elm River birch Willow oak Swamp white oak	100 --- --- --- --- --- --- --- --- --- --- --- --- ---	154 --- --- --- --- --- --- --- --- --- --- --- --- ---	Loblolly pine 1/, hardwoods 2/.
Ch Chowan	8W	Slight	Severe	Severe	Water tupelo Green ash Baldcypress Red maple Sweetgum Pond pine Atlantic white-cedar	80 --- --- --- --- --- ---	114 --- --- --- --- --- ---	Baldcypress, hardwoods 2/.
CtA Conetoe	8S	Slight	Moderate	Moderate	Loblolly pine Southern red oak Post oak White oak Hickory Sweetgum Red maple Shumard oak Longleaf pine Black tupelo	80 --- --- --- --- --- --- --- --- ---	110 --- --- --- --- --- --- --- --- ---	Loblolly pine 1/, hardwoods 2/.
Do Dorovan	7W	Slight	Severe	Severe	Blackgum Sweetbay Baldcypress Swamp tupelo Green ash Pond pine Water tupelo White cedar Red maple	70 --- --- --- --- --- --- --- ---	95 --- --- --- --- --- --- --- ---	Baldcypress.

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
Hy---------- Hyde	10W	Slight	Severe	Severe	Loblolly pine--------	96	145	Loblolly pine 1/, hardwoods 2/.
					Swamp tupelo---------	---	---	
					Water tupelo---------	---	---	
					Sweetgum------------	97	128	
					Water oak-----------	95	92	
					Baldcypress----------	---	---	
					Pond pine-----------	80	68	
					Red maple-----------	---	---	
					Green ash-----------	---	---	
					Black tupelo---------	---	---	
					Elm------------------	---	---	
					Yellow-poplar--------	---	---	
					River birch----------	---	---	
					Willow oak-----------	---	---	
Pe---------- Perquimans	10W	Slight	Severe	Severe	Loblolly pine--------	94	140	Loblolly pine 1/, hardwoods 2/.
					Green ash-----------	---	---	
					Sweetgum------------	---	---	
					Water oak-----------	---	---	
					Red maple-----------	---	---	
					Yellow-poplar--------	---	---	
					Willow oak-----------	---	---	
					Black cherry---------	---	---	
					American beech-------	---	---	
Po---------- Ponzer	6W	Slight	Severe	Severe	Loblolly pine--------	70	93	Loblolly pine 1/.
					Pond pine-----------	---	---	
					Water tupelo---------	60	81	
					Baldcypress----------	---	---	
					Sweetgum------------	---	---	
					Swamp tupelo---------	---	---	
					Sweetbay------------	---	---	
					Redbay---------------	---	---	
					Loblollybay gordonia-	---	---	
					Red maple-----------	---	---	
					Blackgum------------	---	---	
					White cedar----------	---	---	
Pt---------- Portsmouth	10W	Slight	Severe	Severe	Loblolly pine--------	96	145	Loblolly pine 1/, hardwoods 2/.
					Sweetgum------------	---	---	
					Red maple-----------	---	---	
					Water oak-----------	---	---	
					Willow oak-----------	---	---	
					Sweetbay------------	---	---	
					Redbay---------------	---	---	
					Baldcypress----------	---	---	
					Pond pine-----------	---	---	
					Green ash-----------	---	---	
					Black tupelo---------	---	---	
					Swamp tupelo---------	---	---	
					Elm------------------	---	---	
					Yellow-poplar--------	---	---	
					River birch----------	---	---	
Pu---------- Pungo	5W	Slight	Severe	Severe	Pond pine-----------	55	33	Baldcypress.
					Baldcypress----------	---	---	
					Water tupelo---------	---	---	
					Atlantic white-cedar-	95	---	
					Red maple-----------	---	---	
					Sweetbay------------	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class*	
Ro---------- Roanoke	9W	Slight	Severe	Severe	Loblolly pine--------	86	123	Loblolly pine 1/.
					Willow oak----------	76	68	
					Yellow-poplar--------	90	90	
					Red maple----------	---	---	
					Hickory----------	---	---	
					Sweetgum----------	---	---	
					Elm----------	---	---	
					River birch----------	---	---	
					Water oak----------	---	---	
Rp---------- Roper	10W	Slight	Severe	Severe	Loblolly pine--------	96	145	Loblolly pine 1/, hardwoods 2/.
					Pond pine----------	80	68	
					Yellow-poplar--------	---	---	
					Sweetgum----------	97	128	
					Water oak----------	95	92	
					Baldcypress----------	---	---	
					Water tupelo---------	---	---	
					Red maple----------	---	---	
					Sweetbay----------	---	---	
					Blackgum----------	---	---	
StB---------- State	10A	Slight	Slight	Slight	Loblolly pine--------	95	142	Loblolly pine.
					Southern red oak-----	85	67	
					Yellow-poplar--------	100	107	
					Red maple----------	---	---	
					Hickory----------	---	---	
					Black tupelo---------	---	---	
					American elm---------	---	---	
					American beech-------	---	---	
					Water oak----------	---	---	
					White oak----------	---	---	
To---------- Tomotley	10W	Slight	Severe	Severe	Loblolly pine--------	94	140	Loblolly pine 1/, hardwoods 2/.
					Water tupelo---------	---	---	
					Sweetgum----------	90	106	
					Red maple----------	---	---	
					Yellow-poplar--------	---	---	
					Willow oak----------	---	---	
					Water oak----------			
					Black cherry---------	---	---	
					American beech-------	---	---	
WaA---------- Wahee	9W	Slight	Moderate	Moderate	Loblolly pine--------	86	123	Loblolly pine 1/, hardwoods 2/.
					Sweetgum----------	90	106	
					Blackgum----------	---	---	
					Water oak----------	---	---	
					Swamp chestnut oak---	---	---	
					Willow oak----------	---	---	
					Southern red oak-----	---	---	
					Pond pine----------	---	---	
					Red maple----------	---	---	
					Green ash----------	---	---	
					Hickory----------	---	---	
					Black tupelo---------	---	---	
					Elm----------	---	---	
					River birch----------	---	---	
					American sycamore----	---	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class	
Wd---------- Wasda	10W	Slight	Severe	Severe	Loblolly pine--------	96	145	Loblolly pine 1/, hardwoods 2/.
					Water tupelo---------	---	---	
					Sweetgum------------	---	---	
					Water oak-----------	95	92	
					Baldcypress----------	---	---	
					Pond pine-----------	---	---	
					Red maple-----------	---	---	
					Swamp tupelo---------	---	---	
					Sweetbay------------	---	---	
					Blackgum------------	---	---	
Wk---------- Weeksville	9W	Slight	Severe	Severe	Loblolly pine--------	90	131	Loblolly pine 1/, hardwoods 2/.
					Southern red oak-----	---	---	
					White oak-----------	---	---	
					Water tupelo---------	---	---	
					Baldcypress----------	---	---	
					Pond pine-----------	---	---	
					Red maple-----------	---	---	
					Green ash-----------	---	---	
					Sweetgum------------	---	---	
					Black tupelo---------	---	---	
					Elm-----------------	---	---	
					Yellow-poplar--------	---	---	
					River birch----------	---	---	
					Water oak-----------	---	---	
					Willow oak----------	---	---	

1/ Potential productivity is attainable only in areas that have been adequately drained, bedded, or both.

2/ If hardwoods are desired on a forested site, rely on natural reproduction (seeds and sprouts) of acceptable species. Special site preparation techniques are required.

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AaA---- Altavista	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Ap---- Arapahoe	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ar---- Argent	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
At---- Augusta	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Ba---- Belhaven	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
Cf---- Cape Fear	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ch---- Chowan	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
CtA---- Conetoe	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Moderate: droughty.
Do---- Dorovan	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.
Hy---- Hyde	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pe---- Perquimans	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
Po---- Ponzer	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
Pt---- Portsmouth	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pu---- Pungo	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus, too acid.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
Ro---- Roanoke	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Rp---------- Roper	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
StB---------- State	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
To---------- Tomotley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ud. Udorthents					
WaA---------- Wahee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Wd---------- Wasda	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness.	Severe: wetness, excess humus.	Severe: wetness, excess humus.
Wk---------- Weeksville	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 8.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Ratings are based on undrained soil conditions. Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AaA---- Altavista	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ap---- Arapahoe	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Fair.
Ar---- Argent	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
At---- Augusta	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ba---- Belhaven	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Cf---- Cape Fear	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ch---- Chowan	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
CtA---- Conetoe	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Do---- Dorovan	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Hy---- Hyde	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Pe---- Perquimans	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Po---- Ponzer	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Pt---- Portsmouth	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
Pu---- Pungo	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ro---- Roanoke	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Rp---- Roper	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
StB---- State	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
To---- Tomotley	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
Ud. Udorthents										

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
WaA---------- Wahee	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Wd---------- Wasda	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Wk---------- Weeksville	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.

TABLE 9.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AaA---------- Altavista	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Ap---------- Arapahoe	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.
Ar---------- Argent	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
At---------- Augusta	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: low strength, wetness.	Moderate: wetness.
Ba---------- Belhaven	Severe: excess humus, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, excess humus.
Cf---------- Cape Fear	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
Ch---------- Chowan	Severe: excess humus, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
CtA---------- Conetoe	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
Do---------- Dorovan	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: ponding, flooding.	Severe: ponding, flooding, excess humus.
Hy---------- Hyde	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
Pe---------- Perquimans	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, low strength.	Severe: wetness.
Po---------- Ponzer	Severe: excess humus, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, excess humus.
Pt---------- Portsmouth	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Pu--- Pungo	Severe: excess humus, wetness.	Severe: flooding, low strength, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, excess humus.
Ro--- Roanoke	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness.	Severe: wetness.
Rp--- Roper	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, low strength.	Severe: wetness, excess humus.
StB--- State	Severe: cutbanks cave.	Slight---	Moderate: wetness.	Slight---	Moderate: low strength.	Slight.
To--- Tomotley	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness.
Ud. Udorthents						
WaA--- Wahee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
Wd--- Wasda	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, excess humus.
Wk--- Weeksville	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.

TABLE 10.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AaA---- Altavista	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: wetness.
Ap---- Arapahoe	Severe: wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
Ar---- Argent	Severe: percs slowly, wetness.	Severe: flooding, wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
At---- Augusta	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Fair: wetness.
Ba---- Belhaven	Severe: wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
Cf---- Cape Fear	Severe: wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack, wetness.
Ch---- Chowan	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, excess humus.
CtA---- Conetoe	Slight----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
Do---- Dorovan	Severe: flooding, ponding.	Severe: flooding, excess humus, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, ponding.	Poor: ponding, excess humus.
Hy---- Hyde	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Pe---- Perquimans	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Po---- Ponzer	Severe: wetness, percs slowly.	Severe: flooding, excess humus, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Pt---- Portsmouth	Severe: wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Pu---------- Pungo	Severe: percs slowly, wetness.	Severe: seepage, flooding, excess humus.	Severe: wetness, seepage, excess humus.	Severe: wetness, seepage.	Poor: wetness, excess humus.
Ro---------- Roanoke	Severe: wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Rp---------- Roper	Severe: wetness, percs slowly.	Severe: flooding, excess humus, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness, excess humus.
StB---------- State	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, thin layer.
To---------- Tomotley	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ud. Udorthents					
WaA---------- Wahee	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Wd---------- Wasda	Severe: wetness.	Severe: flooding, excess humus, wetness.	Severe: wetness, seepage.	Severe: wetness.	Poor: wetness, excess humus.
Wk---------- Weeksville	Severe: wetness.	Severe: flooding, seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.

TABLE 11.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Topsoil
AaA Altavista	Fair: wetness, thin layer.	Improbable: excess fines.	Fair: too sandy.
Ap Arapahoe	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Ar Argent	Poor: wetness, low strength.	Improbable: excess fines.	Poor: wetness, too clayey.
At Augusta	Fair: wetness.	Improbable: excess fines.	Fair: small stones.
Ba Belhaven	Poor: wetness, low strength.	Improbable: excess fines.	Poor: excess humus, wetness.
Cf Cape Fear	Poor: low strength, wetness.	Improbable: excess fines.	Poor: thin layer, wetness.
Ch Chowan	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
CtA Conetoe	Good	Probable	Fair: too sandy.
Do Dorovan	Poor: wetness.	Probable	Poor: excess humus, wetness.
Hy Hyde	Poor: low strength, wetness.	Improbable: excess fines.	Poor: wetness.
Pe Perquimans	Poor: wetness, low strength.	Improbable: excess fines.	Poor: wetness.
Po Ponzer	Poor: wetness, low strength.	Improbable: excess fines.	Poor: excess humus, wetness.
Pt Portsmouth	Poor: wetness.	Probable	Poor: wetness.
Pu Pungo	Poor: wetness, low strength.	Improbable: excess fines.	Poor: excess humus, wetness.
Ro Roanoke	Poor: wetness.	Improbable: excess fines.	Poor: thin layer, wetness.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Topsoil
Rp---------- Roper	Poor: wetness, low strength.	Improbable: excess fines.	Poor: excess humus, wetness.
StB---------- State	Good----------	Probable----------	Fair: too sandy.
To---------- Tomotley	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Ud. Udorthents			
WaA---------- Wahee	Poor: wetness.	Improbable: excess fines.	Poor: too clayey, wetness.
Wd---------- Wasda	Poor: wetness.	Improbable: excess fines.	Poor: excess humus, wetness.
Wk---------- Weeksville	Poor: wetness.	Improbable: excess fines.	Poor: wetness.

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--			Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions
AaA---- Altavista	Moderate: seepage.	Moderate: wetness.	Moderate: deep to water.	Favorable----	Wetness.
Ap---- Arapahoe	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave----	Wetness.
Ar---- Argent	Slight----	Severe: wetness, hard to pack.	Severe: slow refill.	Percs slowly----	Wetness, percs slowly.
At---- Augusta	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable----	Wetness.
Ba---- Belhaven	Moderate: seepage.	Severe: piping, wetness.	Slight----	Wetness, subsides, percs slowly.	Wetness.
Cf---- Cape Fear	Slight----	Severe: hard to pack, wetness.	Slight----	Percs slowly----	Wetness, percs slowly.
Ch---- Chowan	Severe: seepage.	Severe: excess humus, wetness.	Severe: slow refill.	Flooding----	Wetness.
CtA---- Conetoe	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water----	Too sandy.
Do---- Dorovan	Moderate: seepage.	Severe: excess humus, ponding.	Severe: cutbanks cave.	Ponding, flooding, subsides.	Ponding.
Hy---- Hyde	Slight----	Severe: wetness.	Slight----	Favorable----	Wetness, erodes easily.
Pe---- Perquimans	Slight----	Severe: piping, wetness.	Severe: slow refill.	Favorable----	Erodes easily, wetness.
Po---- Ponzer	Moderate: seepage.	Severe: wetness.	Slight----	Percs slowly, subsides.	Wetness, percs slowly.
Pt---- Portsmouth	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave----	Wetness, too sandy.
Pu---- Pungo	Severe: seepage.	Severe: excess humus, wetness.	Slight----	Subsides----	Wetness.
Ro---- Roanoke	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Percs slowly----	Wetness, percs slowly.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions
Rp---------- Roper	Slight----------	Severe: wetness.	Slight----------	Subsides---------	Wetness, erodes easily.
StB---------- State	Moderate: seepage.	Moderate: thin layer, piping.	Severe: cutbanks cave.	Deep to water----	Soil blowing.
To---------- Tomotley	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Favorable--------	Wetness, soil blowing.
Ud. Udorthents					
WaA---------- Wahee	Slight----------	Severe: wetness, hard to pack.	Severe: slow refill.	Percs slowly-----	Wetness, percs slowly.
Wd---------- Wasda	Moderate: seepage.	Severe: wetness.	Slight----------	Subsides---------	Wetness.
Wk---------- Weeksville	Severe: seepage.	Severe: piping, wetness.	Slight----------	Favorable--------	Erodes easily, wetness.

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils may have Unified classifications and USDA textures in addition to those shown. In general, the dominant classifications and textures are shown]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AaA---------- Altavista	0-10	Loamy fine sand	SM	A-2	0	95-100	90-100	50-99	15-35	---	NP
	10-43	Clay loam, sandy clay loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-7	0	95-100	95-100	60-99	45-75	20-45	5-28
	43-60	Variable---------	---	---	---	---	---	---	---	---	---
Ap---------- Arapahoe	0-12	Fine sandy loam	SM	A-2, A-4	0	100	100	80-100	20-49	<30	NP-4
	12-38	Fine sandy loam, loam, sandy loam.	SM	A-2, A-4	0	100	100	70-100	20-49	---	NP
	38-62	Stratified sand to loamy fine sand.	SM, SP-SM	A-2, A-3, A-4	0	100	100	65-100	5-45	<30	NP-4
Ar---------- Argent	0-6	Silt loam--------	CL, CL-ML, ML	A-6, A-4	0	100	98-100	90-100	65-95	20-40	3-20
	6-48	Clay, sandy clay, silty clay, silty clay loam.	CL, CH, CL-ML	A-6, A-7	0	100	98-100	90-100	55-98	30-60	11-40
	48-54	Sandy clay loam, clay loam, silty clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-7	0	100	98-100	90-100	40-80	22-49	6-28
	54-70	Variable---------	---	---	---	---	---	---	---	---	---
At---------- Augusta	0-6	Fine sandy loam	SM, SM-SC, ML	A-2, A-4	0	90-100	75-100	50-98	30-60	<25	NP-7
	6-49	Sandy clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	90-100	75-100	75-100	51-80	20-45	5-25
	49-62	Variable---------	---	---	---	---	---	---	---	---	---
Ba---------- Belhaven	0-43	Muck-------------	PT	---	---	---	---	---	---	---	---
	43-51	Sandy loam, fine sandy loam, mucky loam.	SM, SC, SM-SC	A-2, A-4	0	100	100	60-85	30-49	<30	NP-10
	51-60	Loam, clay loam, sandy clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0	100	100	80-100	36-95	16-36	4-15
Cf---------- Cape Fear	0-11	Loam-------------	ML, CL-ML, CL	A-4, A-6	0	100	95-100	85-100	60-90	20-40	3-15
	11-50	Clay loam, clay, silty clay.	ML, CL, MH, CH	A-7	0	100	95-100	90-100	60-85	41-65	15-35
	50-62	Variable---------	---	---	---	---	---	---	---	---	---
Ch---------- Chowan	0-6	Silt loam--------	CL-ML, ML, MH	A-7-5, A-4, A-6	0	100	100	90-100	85-95	22-60	4-24
	6-25	Loam, silt loam, silty clay loam.	CL, MH, ML	A-7-5, A-4, A-6	0	100	100	90-100	85-96	22-62	6-30
	25-70	Sapric material	PT	---	---	---	---	---	---	---	NP
CtA---------- Conetoe	0-26	Loamy fine sand	SM, SP-SM	A-2, A-3	0	100	100	50-99	5-30	<20	NP
	26-38	Sandy loam, sandy clay loam, fine sandy loam.	SM, SC, SM-SC	A-2, A-4	0	100	100	50-99	20-40	<30	NP-10
	38-65	Loamy sand, sand, loamy fine sand, fine sand.	SM, SP, SP-SM	A-2, A-3, A-1	0	100	100	50-99	4-30	<20	NP
Do---------- Dorovan	0-90	Muck-------------	PT	---	0	---	---	---	---	---	---

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Hy	0-15	Loam	CL-ML, ML	A-4	0	100	98-100	85-100	60-90	<36	NP-7
Hyde	15-51	Clay loam, loam, silty clay loam.	CL	A-6, A-4, A-7	0	100	98-100	90-100	75-95	22-42	7-20
	51-62	Variable	---	---	---	---	---	---	---	---	---
Pe	0-7	Loam	ML, CL-ML	A-4	0	100	100	85-100	55-95	<40	NP-7
Perquimans	7-40	Loam, silty clay loam, clay loam.	CL	A-4, A-6, A-7	0	100	100	90-100	75-98	22-49	8-30
	40-65	Silt loam, loam, sandy loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	100	85-100	55-95	<30	NP-7
Po	0-30	Muck	PT	---	---	---	---	---	---	---	---
Ponzer	30-55	Loam, sandy clay loam, silt loam, clay loam.	SM, ML, SC, CL, CL-ML	A-2, A-4, A-6	0	100	100	60-95	30-95	<40	NP-20
	55-70	Variable	---	---	---	---	---	---	---	---	---
Pt	0-14	Loam	SM, SM-SC, ML	A-2, A-4	0	98-100	98-100	65-95	30-65	<30	NP-7
Portsmouth	14-35	Loam, sandy clay loam, clay loam.	SC, CL-ML, CL	A-4, A-6	0	98-100	98-100	75-95	36-70	18-40	7-18
	35-65	Stratified coarse sand to loamy sand.	SP-SM, SP, SM	A-1, A-2, A-3	0	98-100	98-100	45-65	3-25	---	NP
Pu	0-65	Muck	PT	---	---	---	---	---	---	---	---
Pungo	65-95	Clay, silty clay, sandy clay, clay loam, mucky loam.	CH, CL, SC, CL-ML SM, ML	A-7, A-6 A-2, A-4	0	100	95-100	85-100	36-95	<65	NP-35
Ro	0-8	Loam	SM-SC, CL-ML, CL, SC	A-4, A-6	0	95-100	85-100	60-100	35-90	20-35	5-16
Roanoke	8-43	Clay, silty clay, clay loam, loam.	CH, CL, CL-ML	A-7, A-4, A-6	0	90-100	85-100	85-100	35-95	20-70	5-40
	43-60	Variable	---	---	---	---	---	---	---	---	---
Rp	0-10	Muck	PT	---	---	---	---	---	---	---	---
Roper	10-14	Silt loam, silty clay loam, loam.	CL	A-4, A-6	0	100	100	90-100	60-95	20-40	8-25
	14-44	Silt loam, silty clay loam, loam.	CL	A-4, A-6	0	100	100	90-100	60-95	20-40	8-25
	44-60	Variable	---	---	---	---	---	---	---	---	---
StB	0-7	Loamy fine sand	SM, SM-SC	A-2, A-1	0	95-100	95-100	45-75	15-30	<18	NP-6
State	7-42	Loam, clay loam, sandy loam, sandy clay loam.	CL, SC	A-4, A-6	0	95-100	95-100	75-100	35-80	20-40	8-22
	42-80	Stratified sand to fine sandy loam.	SM, SM-SC, SP-SM	A-1, A-2, A-3, A-4	0	85-100	75-100	40-90	5-50	<25	NP-7
To	0-8	Fine sandy loam.	SM	A-2, A-4	0	98-100	95-100	75-99	25-50	<30	NP-7
Tomotley	8-29	Fine sandy loam, sandy clay loam, clay loam.	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	0	98-100	95-100	75-99	30-70	20-40	6-23
	29-36	Sandy loam, sandy clay loam, sandy clay.	SM-SC, SC, CL-ML, CL	A-4, A-6, A-7	0	98-100	95-100	75-98	36-75	20-45	6-22
	36-60	Variable	---	---	---	---	---	---	---	---	---

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ud. Udorthents											
WaA---------- Wahee	0-5	Loam----------	ML, CL-ML, CL	A-4	0	100	100	90-98	51-75	20-35	2-10
	5-40	Clay, clay loam, silty clay.	CL, CH	A-6, A-7	0	100	100	85-100	51-90	38-77	16-54
	40-60	Variable---------	---	---	---	---	---	---	---	---	---
Wd---------- Wasda	0-15	Muck----------	PT	---	0	---	---	---	---	---	NP
	15-33	Clay loam, sandy clay loam, sandy loam.	ML, CL, CL-ML	A-2, A-4, A-6	0	98-100	95-100	75-99	50-80	20-40	6-18
	33-42	Sandy loam, loam	ML, SM, CL-ML, SM-SC	A-4	0	98-100	95-100	75-95	45-70	<25	NP-7
	42-65	Variable---------	---	---	---	---	---	---	---	---	---
Wk---------- Weeksville	0-42	Silt loam, very fine sandy loam.	CL-ML, ML, MH	A-4, A-5	0	100	100	85-100	60-95	20-55	NP-7
	42-62	Sand, loamy sand, loamy fine sand.	SM, SP-SM	A-2	0	100	100	50-100	11-35	---	NP

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
AaA----------	0-10	6.0-20	0.07-0.12	4.5-6.0	Low----------	0.17	5	.5-3
Altavista	10-43	0.6-2.0	0.12-0.20	4.5-6.0	Low----------	0.24		
	43-60	---	---	---	----------	-----		
Ap----------	0-12	2.0-6.0	0.11-0.15	3.6-5.5	Low----------	0.15	5	5-20
Arapahoe	12-38	2.0-6.0	0.10-0.14	3.6-7.8	Low----------	0.15		
	38-62	2.0-20	0.05-0.14	5.6-7.8	Low----------	0.10		
Ar----------	0-6	0.6-2.0	0.15-0.20	3.6-6.0	Low----------	0.32	5	1-3
Argent	6-48	0.06-0.2	0.14-0.18	3.6-6.0	Moderate-------	0.32		
	48-54	0.06-0.6	0.12-0.16	5.6-7.8	Moderate-------	0.32		
	54-70	---	---	---	----------	-----		
At----------	0-6	2.0-6.0	0.10-0.15	4.5-6.0	Low----------	0.20	4	.5-2
Augusta	6-49	0.6-2.0	0.12-0.18	4.5-6.0	Low----------	0.24		
	49-62	---	---	---	----------	-----		
Ba----------	0-43	0.2-6.0	0.20-0.26	<4.5	Low----------	-----	---	20-80
Belhaven	43-51	2.0-6.0	0.10-0.15	3.6-5.5	Low----------	0.24		
	51-60	0.2-0.6	0.12-0.20	3.6-6.5	Low----------	0.24		
Cf----------	0-11	0.6-6.0	0.15-0.22	4.5-6.5	Low----------	0.15	5	5-15
Cape Fear	11-50	0.06-0.2	0.12-0.22	4.5-6.0	Moderate-------	0.32		
	50-62	---	---	---	----------	-----		
Ch----------	0-6	2.0-6.0	0.15-0.20	3.6-6.0	Low----------	0.32	4	2-4
Chowan	6-25	0.2-0.6	0.15-0.20	3.6-6.0	Low----------	0.32		
	25-70	0.2-6.0	0.20-0.26	3.6-5.0	Low----------	-----		
CtA----------	0-26	6.0-20	0.05-0.10	4.5-6.0	Low----------	0.15	5	.5-2
Conetoe	26-38	2.0-6.0	0.10-0.15	4.5-6.0	Low----------	0.15		
	38-65	6.0-20	0.05-0.10	4.5-6.0	Low----------	0.10		
Do----------	0-90	0.6-2.0	0.25-0.50	3.6-4.4	----------	-----	---	---
Dorovan								
Hy----------	0-15	0.6-2.0	0.13-0.20	3.6-5.5	Low----------	0.17	5	4-15
Hyde	15-51	0.2-0.6	0.15-0.20	3.6-5.5	Low----------	0.43		
	51-62	---	---	---	----------	-----		
Pe----------	0-7	2.0-6.0	0.13-0.20	4.5-6.5	Low----------	0.37	4	2-4
Perquimans	7-40	0.2-0.6	0.15-0.20	4.5-6.0	Low----------	0.43		
	40-65	0.2-0.6	0.13-0.20	4.5-6.0	Low----------	0.37		
Po----------	0-30	0.06-2.0	0.35-0.45	3.6-4.4	Low----------	-----	---	20-80
Ponzer	30-55	0.06-2.0	0.10-0.24	3.6-6.5	Low----------	0.24		
	55-70	---	---	---	Low----------	-----		
Pt----------	0-14	0.6-6.0	0.12-0.18	3.6-5.5	Low----------	0.24	5	3-15
Portsmouth	14-35	0.6-2.0	0.14-0.20	3.6-5.5	Low----------	0.28		
	35-65	6.0-20	0.02-0.05	3.6-6.0	Low----------	0.17		
Pu----------	0-65	0.2-6.0	0.20-0.26	<4.5	Low----------	-----	---	40-90
Pungo	65-95	0.2-6.0	0.12-0.18	3.6-5.5	Moderate-------	0.24		
Ro----------	0-14	0.6-2.0	0.14-0.20	4.5-5.5	Low----------	0.37	4	.5-2
Roanoke	14-35	0.06-0.2	0.10-0.19	4.5-5.5	Moderate-------	0.24		
	35-60	0.06-20	0.04-0.14	4.5-5.5	Moderate-------	0.24		

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
Rp	0-10	0.2-6.0	0.24-0.46	3.6-5.5	Low	-----	---	20-50
Roper	10-14	0.2-0.6	0.16-0.24	3.6-5.5	Low	0.43		
	14-44	0.2-0.6	0.16-0.24	5.6-7.8	Low	0.43		
	44-60	---	---	5.6-7.8	---	-----		
StB	0-7	2.0-6.0	0.06-0.09	4.5-5.5	Low	0.28	5	<1
State	7-42	0.6-2.0	0.14-0.19	4.5-5.5	Low	0.28		
	42-80	>2.0	0.02-0.10	4.5-6.0	Low	0.17		
To	0-8	2.0-6.0	0.10-0.15	3.6-5.5	Low	0.20	5	1-6
Tomotley	8-29	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.20		
	29-36	0.2-2.0	0.12-0.18	3.6-6.0	Low	0.20		
	36-60	---	---	---	---	-----	---	---
Ud. Udorthents								
WaA	0-5	0.2-2.0	0.15-0.20	4.5-6.0	Low	0.28	5	.5-5
Wahee	5-40	0.06-0.2	0.12-0.20	4.5-5.5	Moderate	0.28		
	40-60	0.2-0.6	0.12-0.20	4.5-5.5	Moderate	0.28		
Wd	0-15	0.2-0.6	0.20-0.25	3.6-5.5	---	-----	---	20-50
Wasda	15-33	0.6-2.0	0.12-0.18	4.5-5.5	Low	0.20		
	33-42	0.6-2.0	0.12-0.18	5.6-7.8	Low	0.24		
	42-65	6.0-20	0.02-0.06	5.6-7.8	Low	0.15		
Wk	0-42	0.6-2.0	0.18-0.26	4.5-5.5	Low	0.43	5	3-8
Weeksville	42-62	2.0-6.0	0.05-0.10	4.5-5.5	Low	0.32		

TABLE 15.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
AaA---- Altavista	C	None----	---	---	1.5-2.5	Apparent	Dec-Mar	Moderate	Moderate.
Ap---- Arapahoe	BD	Rare----	---	---	0-1.0	Apparent	Dec-May	High----	High.
Ar---- Argent	D	Rare----	---	---	0-1.0	Apparent	Nov-Apr	High----	High.
At---- Augusta	C	None----	---	---	1.0-2.0	Apparent	Jan-May	High----	Moderate.
Ba---- Belhaven	D	Rare----	---	---	0-1.0	Apparent	Dec-May	High----	High.
Cf---- Cape Fear	D	Rare----	---	---	0-1.5	Apparent	Dec-Apr	High----	High.
Ch---- Chowan	D	Frequent----	Very long	Nov-Apr	0-0.5	Apparent	Nov-Apr	High----	High.
CtA---- Conetoe	A	None----	---	---	>6.0	---	---	Low----	High.
Do---- Dorovan	D	Frequent----	Very long	Jan-Dec	+1-0.5	Apparent	Jan-Dec	High----	High.
Hy---- Hyde	BD	Rare----	---	---	0-1.5	Apparent	Dec-Apr	High----	High.
Pe---- Perquimans	D	Rare----	---	---	0-1.0	Apparent	Nov-Apr	High----	High.
Po---- Ponzer	D	Rare----	---	---	0-1.0	Apparent	Dec-May	High----	High.
Pt---- Portsmouth	BD	Rare----	---	---	0-1.0	Apparent	Dec-Apr	High----	High.
Pu---- Pungo	D	Rare----	---	---	0-1.0	Apparent	Dec-May	High----	High.
Ro---- Roanoke	D	Rare----	---	---	0-1.0	Apparent	Nov-May	High----	High.
Rp---- Roper	BD	Rare----	---	---	0-1.5	Apparent	Dec-May	High----	High.
StB---- State	B	None----	---	---	4.0-6.0	Apparent	Dec-Jun	Moderate	High.
To---- Tomotley	A	Rare----	---	---	0-1.0	Apparent	Dec-Mar	High----	High.
Ud. Udorthents									

TABLE 15.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
WaA---------- Wahee	D	None--------	---	---	0.5-1.5	Apparent	Dec-Mar	High-----	High.
Wd---------- Wasda	BD	Rare--------	---	---	0-1.0	Apparent	Dec-May	High-----	High.
Wk---------- Weeksville	BD	Rare--------	---	---	0-1.0	Apparent	Dec-Mar	High-----	Moderate.

TABLE 16.--ENGINEERING INDEX TEST DATA

[NP means nonplastic]

Soil name, sample number, horizon, and depth (in inches)	Classification		Grain-size distribution							Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--				Percentage smaller than--						
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.05 mm	.005 mm	.002 mm			Maximum density	Optimum moisture
											Pct	lb/Ft^3	Pct
Conetoe loamy fine sand: [S83NC-177-8-[1-3-5]													
Ap - - - - - - - 0-7	A-2-4[0]	SM	100	100	98	18	12	6	4	20	NP	108.3	12.7
Bt2 - - - - - - - 32-38	A-4[0]	SC	100	100	99	40	33	27	23	25	8	117.0	13.1
C - - - - - - - 45-65	A-2-4[0]	SM	100	100	98	16	13	8	6	20	NP	108.0	13.2
Hyde loam: [S83NC-177-10-[1-3]													
Ap - - - - - - - 0-8	A-4(2)	ML	100	100	99	90	32	15	9	36	NP	80.9	27.6
Btg1 - - - - - - - 15-35	A-6[9]	CL	100	100	100	86	49	31	26	30	12	110.1	15.6
Perquimans loam: [S83NC-177-11-[1-4-5]													
A - - - - - - - 0-4	A-4[3]	ML	100	100	98	91	24	7	4	38	NP	82.7	25A
Btg2 - - - - - - - 15-40	A-6[12]	CL	100	100	100	97	46	31	26	32	12	118.8	14.0
Cg1 - - - - - - - 40-50	A-4[4]	ML	100	100	100	93	26	18	15	28	5	107.3	16.8
Weeksville silt loam: [S83NC-177-21-[1-3]													
Ap - - - - - - - 0-13	A-5[9]	MH	100	100	99	78	28	11	6	54	NP	69.8	35.6
Bg2 - - - - - - - 26-36	A-4[0]	ML	100	100	100	79	19	11	8	25	NP	101.91	17.2

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Altavista	Fine-loamy, mixed, thermic Aquic Hapludults
Arapahoe	Coarse-loamy, mixed, nonacid, thermic Typic Humaquepts
Argent	Fine, mixed, thermic Typic Ochraqualfs
Augusta	Fine-loamy, mixed, thermic Aeric Ochraquults
Belhaven	Loamy, mixed, dysic, thermic Terric Medisaprists
Cape Fear	Clayey, mixed, thermic Typic Umbraquults
Chowan	Fine-silty, mixed, nonacid, thermic Thapto-Histic Fluvaquents
Conetoe	Loamy, mixed, thermic Arenic Hapludults
Dorovan	Dysic, thermic Typic Medisaprists
Hyde	Fine-silty, mixed, thermic Typic Umbraquults
Perquimans	Fine-silty, mixed, thermic Typic Ochraquults
Ponzer	Loamy, mixed, dysic, thermic Terric Medisaprists
Portsmouth	Fine-loamy over sandy or sandy-skeletal, mixed, thermic Typic Umbraquults
Pungo	Dysic, thermic Typic Medisaprists
Roanoke	Clayey, mixed, thermic Typic Ochraquults
Roper	Fine-silty, mixed, nonacid, thermic Histic Humaquepts
State	Fine-loamy, mixed, thermic Typic Hapludults
Tomotley	Fine-loamy, mixed, thermic Typic Ochraquults
Wahee	Clayey, mixed, thermic Aeric Ochraquults
Wasda	Fine-loamy, mixed, nonacid, thermic Histic Humaquepts
Weeksville	Coarse-silty, mixed, acid, thermic Typic Humaquepts

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
MICHIGAN AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

KALAMAZOO COUNTY, MICHIGAN

Scale 1:190,080

1 0 1 2 3 4 Miles

N

SOIL LEGEND

1 Schoolcraft: Nearly level and undulating, well drained soils that have a loamy subsoil; formed in glacial outwash

2 Kalamazoo–Schoolcraft: Nearly level to rolling, well drained soils that have a loamy subsoil or a loamy and sandy subsoil; formed in glacial outwash

3 Kalamazoo–Oshtemo: Nearly level to rolling, well drained soils that have a loamy and sandy subsoil; formed in glacial outwash and morainic deposits

4 Oshtemo–Coloma–Kalamazoo: Undulating to steep, well drained or somewhat excessively drained soils that have a sandy subsoil or a loamy and sandy subsoil; formed in glacial outwash and sandy morainic deposits

5 Riddles–Sleeth: Nearly level to rolling, well drained or somewhat poorly drained soils that have a loamy subsoil; formed in glacial till and outwash

6 Oshtemo–Kalamazoo–Glendora: Nearly level and undulating, well drained or very poorly drained soils that have a sandy subsoil or a loamy and sandy subsoil; formed in glacial outwash and sandy alluvium

7 Coloma–Spinks–Oshtemo: Nearly level to rolling, somewhat excessively drained or well drained soils that have a sandy subsoil or a loamy and sandy subsoil; formed in glacial outwash and sandy morainic deposits

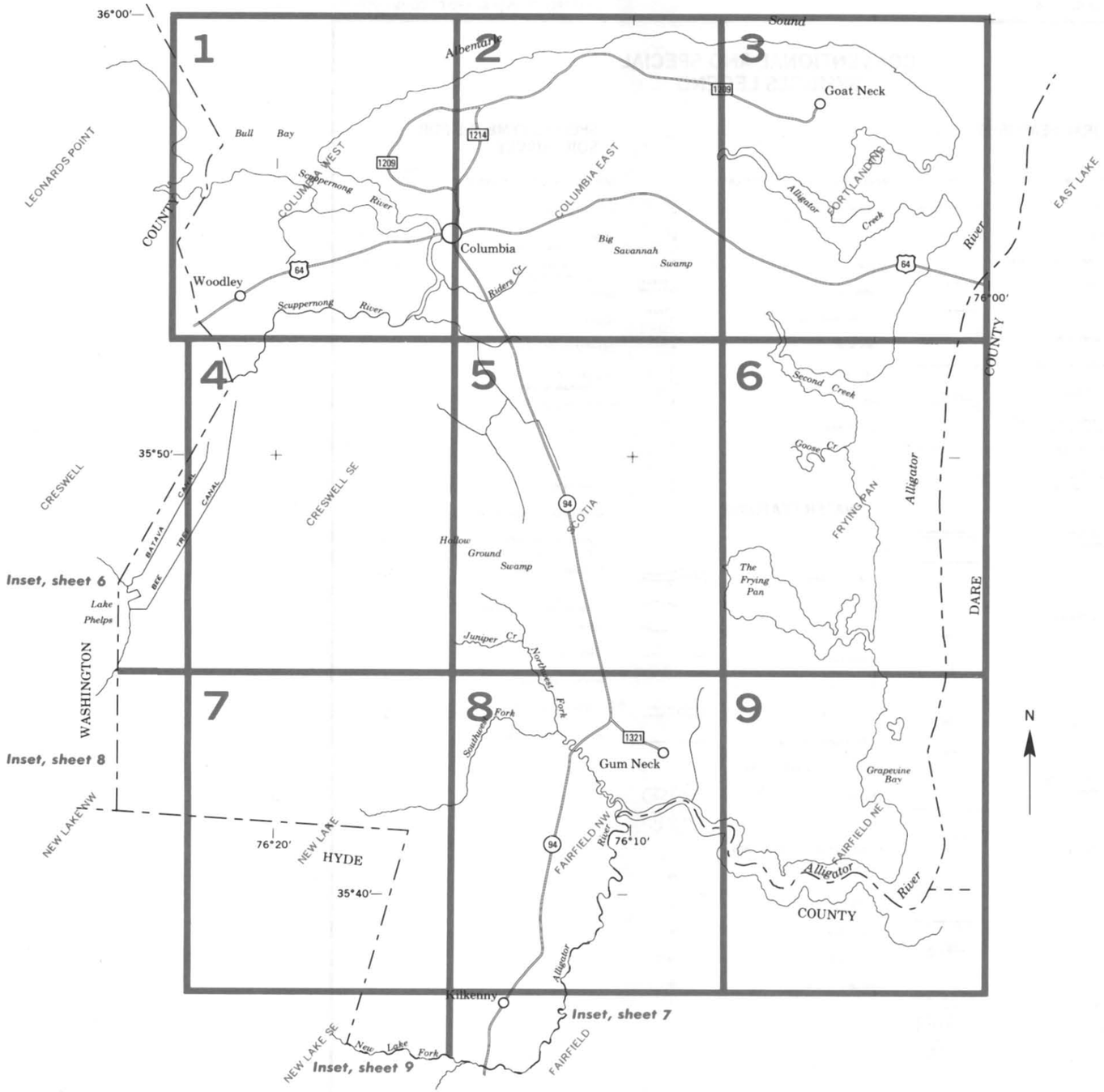
8 Thetford–Gilford–Granby: Nearly level, somewhat poorly drained to very poorly drained soils that have a sandy subsoil or a loamy and sandy subsoil; formed in glacial outwash

Compiled 1978

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

TYRRELL COUNTY, NORTH CAROLINA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km

SOIL LEGEND

Soil Map symbols and map unit names are alphabetical (map symbols are letters). The first letter, always a capital, is the initial letter of the soils series name or higher category. The second letter is a small letter. The third letter, where used, is always a capital and denotes slope. Symbols without slope designation are those of nearly level soils.

SYMBOL	NAME
AaA	Altavista loamy fine sand, 0 to 2 percent slopes
Ap	Arapahoe fine sandy loam, rarely flooded
Ar	Argent silt loam, rarely flooded
At	Augusta fine sandy loam
Ba	Belhaven muck, rarely flooded
Cf	Cape Fear loam, rarely flooded
Ch	Chowan silt loam, frequently flooded
CtA	Conetoe loamy fine sand, 0 to 3 percent slopes
Do	Dorovan muck, frequently flooded
Hy	Hyde loam, rarely flooded
Pe	Perquimans loam, rarely flooded
Po	Ponzer muck, rarely flooded
Pt	Portsmouth loam, rarely flooded
Pu	Pungo muck, rarely flooded
Ro	Roanoke loam, rarely flooded
Rp	Roper muck, rarely flooded
StB	State loamy fine sand, 0 to 4 percent slopes
To	Tomotley fine sandy loam, rarely flooded
Ud	Udorthents, loamy
WaA	Wahee loam, 0 to 3 percent slopes
Wd	Wasda muck, rarely flooded
Wk	Weeksville silt loam, rarely flooded

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline
- AD HOC BOUNDARY (label)
- Small airport, airfield, park, oilfield, cemetery, or flood pool
- STATE COORDINATE TICK
- LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate
- Federal
- State
- County, farm or ranch

- RAILROAD
- POWER TRANSMISSION LINE (normally not shown)
- PIPE LINE (normally not shown)
- FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label)
- Located object (label)
- Tank (label)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
- Double-line (label)
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot < 2 acres

SPECIAL SYMBOLS FOR SOIL SURVEY

- SOIL DELINEATIONS AND SYMBOLS
- ESCARPMENTS
  - Bedrock (points down slope)
  - Other than bedrock (points down slope)
- SHORT STEEP SLOPE
- GULLY
- DEPRESSION OR SINK
- SOIL SAMPLE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 1
TYRRELL COUNTY, NORTH CAROLINA

76°15'00"
36°00'00"
2 780 000 FEET
820 000 FEET

SOUND
ALBEMARLE
BULL
BAY
SCUPPERNONG
RIVER

Norman Smith Legion Beach
Mill Point
River Neck
River Neck Landing
Colonial Beach
Back Landing
Columbia (county seat)
Travis
Woodley
Simmons Landing
Cross Landing
Dunbars Landing
Second Creek
RIDERS CREEK
WASHINGTON Burton Creek
WASHINGTON COUNTY
APPROXIMATE BOUNDARY
Bay
water

(Joins sheet 2)
(Joins sheet 4)

2 810 000 FEET
790 000 FEET
35°52'30"
76°22'30"

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

TYRRELL COUNTY, NORTH CAROLINA NO. 1

SHEET NO. 1 OF 9

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 2
TYRRELL COUNTY, NORTH CAROLINA

76° 07'30"
36° 00'00"
2 820 000 FEET
8 30 000 FEET

ALBEMARLE SOUND
Ship Point
Palmetto Point
Hidden Lake
Soundside
Columbia (county seat)
Dillion Ridge
Newfoundland
LITTLE ALLIGATOR R.
Cranberry Island
BIG SAVANNA
Levels
Malachi Chapel
Pleasant View
Jerry
Mills Ridge
Riders Creek
Second Creek

(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 5)

35° 52'30"
76° 15'00"
2 850 000 FEET
790 000 FEET

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

TYRRELL COUNTY, NORTH CAROLINA NO. 2

SHEET NO. 2 OF 9

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5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

TYRRELL COUNTY, NORTH CAROLINA NO. 3

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 4
TYRRELL COUNTY, NORTH CAROLINA

(Joins sheet 1)

2 780 000 FEET

76°15'00"

35°52'30"

780 000 FEET

SCUPPERNONG RIVER

WASHINGTON COUNTY

Cross Landing

New Lands

HOLLOW GROUND SWAMP

APPROXIMATE BOUNDARY

(Joins sheet 5)

(Joins inset, sheet 6)

35°45'00"

76°22'30"

(Joins sheet 7)

2 810 000 FEET

740 000 FEET

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

TYRRELL COUNTY, NORTH CAROLINA NO. 4

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 5
TYRRELL COUNTY, NORTH CAROLINA

(Joins sheet 2)

76°07'30"
35°52'30"

2 820 000 FEET

780 000 FEET

Scotia
Lookout Tower
HOLLOW GROUND SWAMP
Northwest Fork Alligator River
Juniper Creek
Coppers Creek

(Joins sheet 4)
(Joins sheet 6)
(Joins sheet 8)

35°45'00"
76°15'00"

2 850 000 FEET

750 000 FEET

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

5000 4000 3000 2000 1000 0 5000 10000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24000

N

TYRRELL COUNTY, NORTH CAROLINA NO. 5

(Joins sheet 3)

2 860 000 FEET

76°00'00"

35°52'30"

780 000 FEET

Second Creek Point

SECOND CREEK

ALLIGATOR RIVER

DARE COUNTY

Creek

Goose Creek

THE FRYING PAN

Frying Pan Landing

Coopers Creek

Crane Island Point

Crane Island

The Straits

Lyons Point

Catfish Point

Orange Point

Babbitt Bay

2 770 000 FEET

760 000 FEET

WASHINGTON COUNTY

Phelps Lake

750 000 FEET

740 000 FEET

2 775 000 FEET

(Joins sheet 5)

(Joins sheet 4)

(Joins inset, sheet 8)

(Joins sheet 9)

5000 AND 10000-FOOT GRID TICKS

2 890 000 FEET

5'00"

76°07'30"

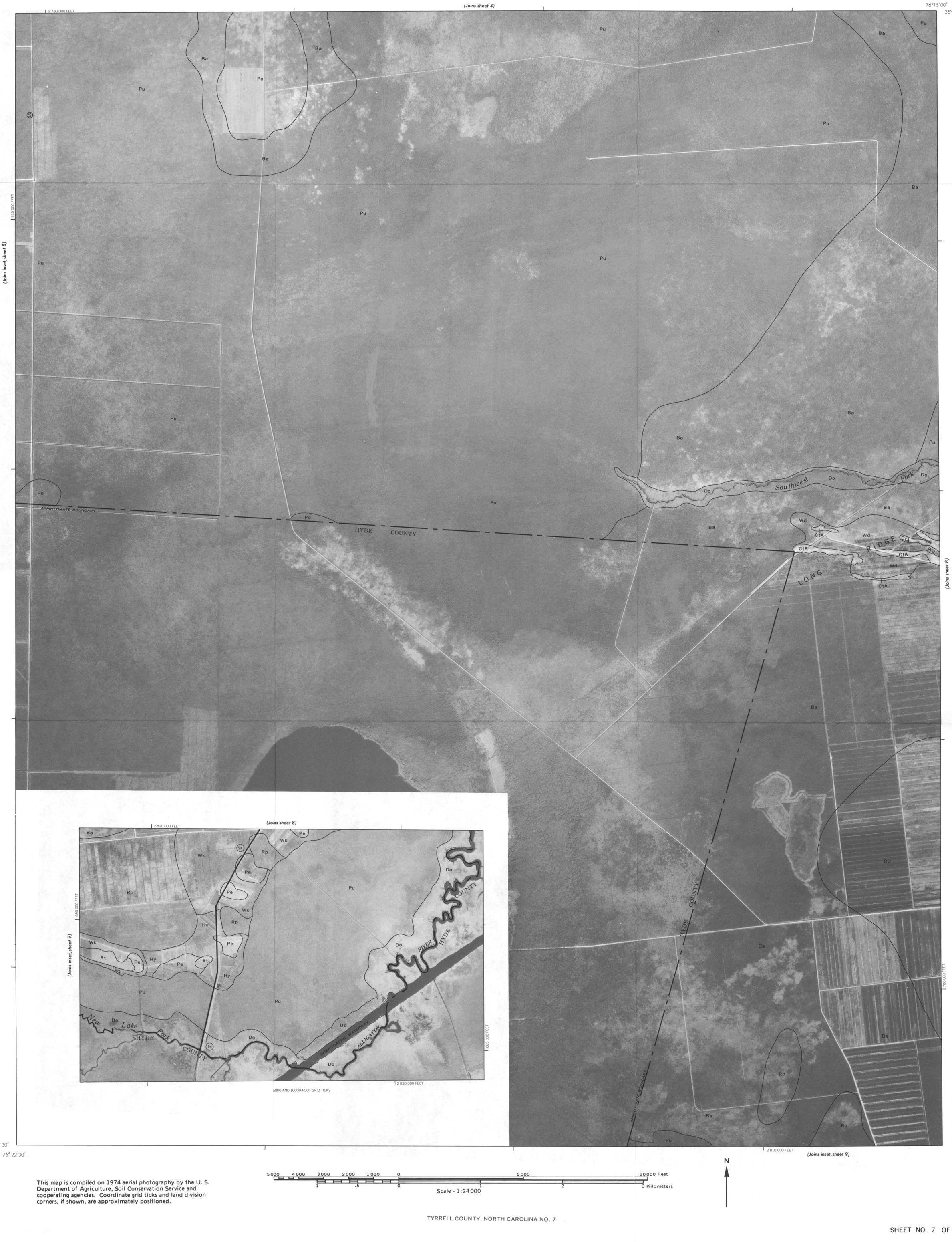
This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N



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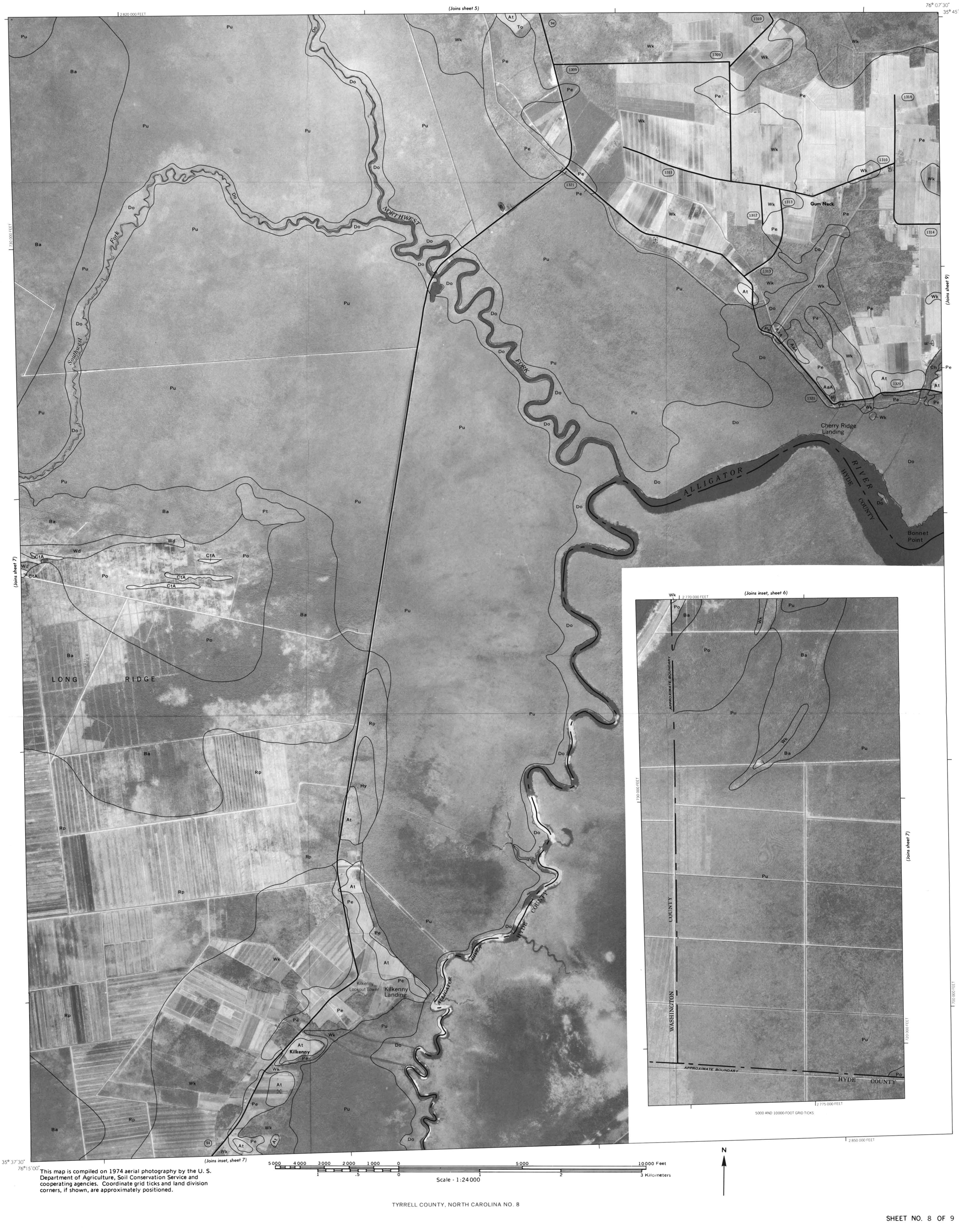
5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet
1 .5 0 1 2 3 Kilometers
Scale - 1:24 000

N

TYRRELL COUNTY, NORTH CAROLINA NO. 7

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 8
TYRRELL COUNTY, NORTH CAROLINA



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TYRRELL COUNTY, NORTH CAROLINA NO. 8

(Joins sheet 6)

2 860 000 FEET

740 000 FEET

76° 00' 00"

35° 45' 00"

Clabber Point

Grapevine Marsh

Grapevine Landing

Grapevine Bay

Rattlesnake Bay

ALLIGATOR RIVER

DARE COUNTY

BUCK ISLAND

Gum Neck Landing

Gum Neck Cr

Point Lookout

ALLIGATOR RIVER

HYDE COUNTY

Bear Point

Tuckahoe Point

Newport News Point

(Joins sheet 8)

(Joins sheet 7)

2 800 000 FEET

690 000 FEET

HYDE COUNTY

New Lake Fk

2 810 000 FEET

685 000 FEET

(Joins inset, sheet 7)

5000 AND 10000-FOOT GRID TICKS

35° 37' 30"

76° 07' 30"

2 890 000 FEET

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

TYRRELL COUNTY, NORTH CAROLINA NO. 9